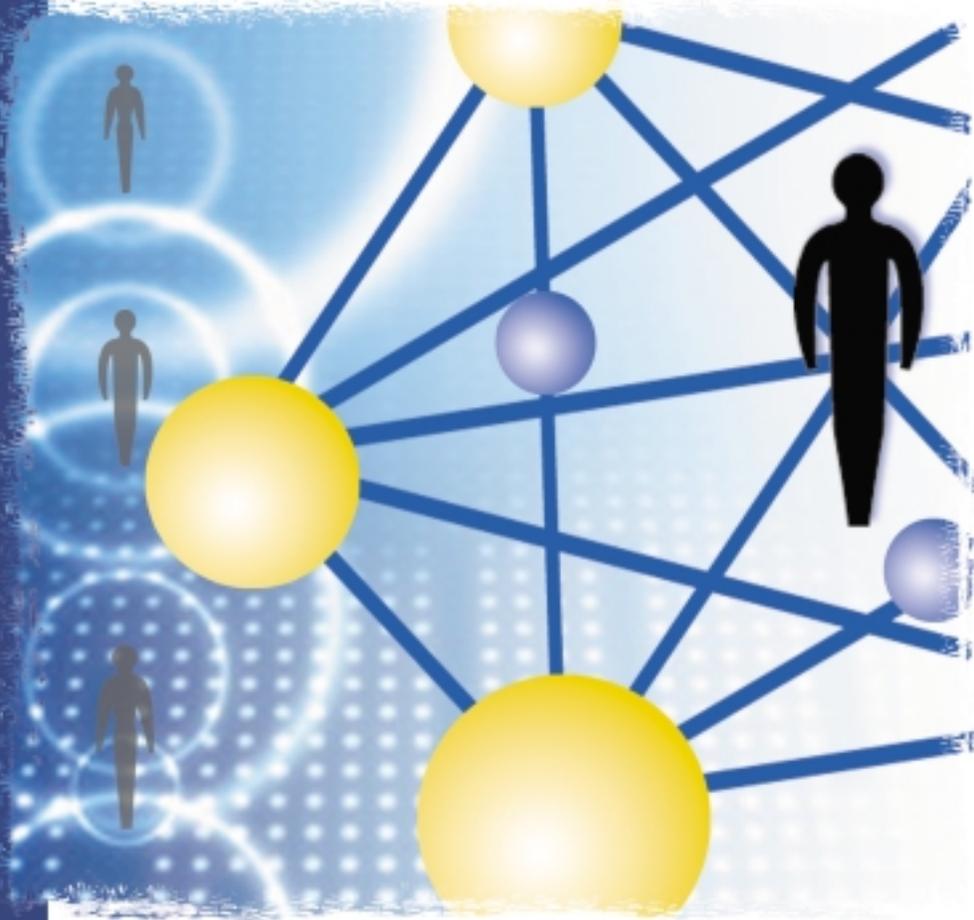


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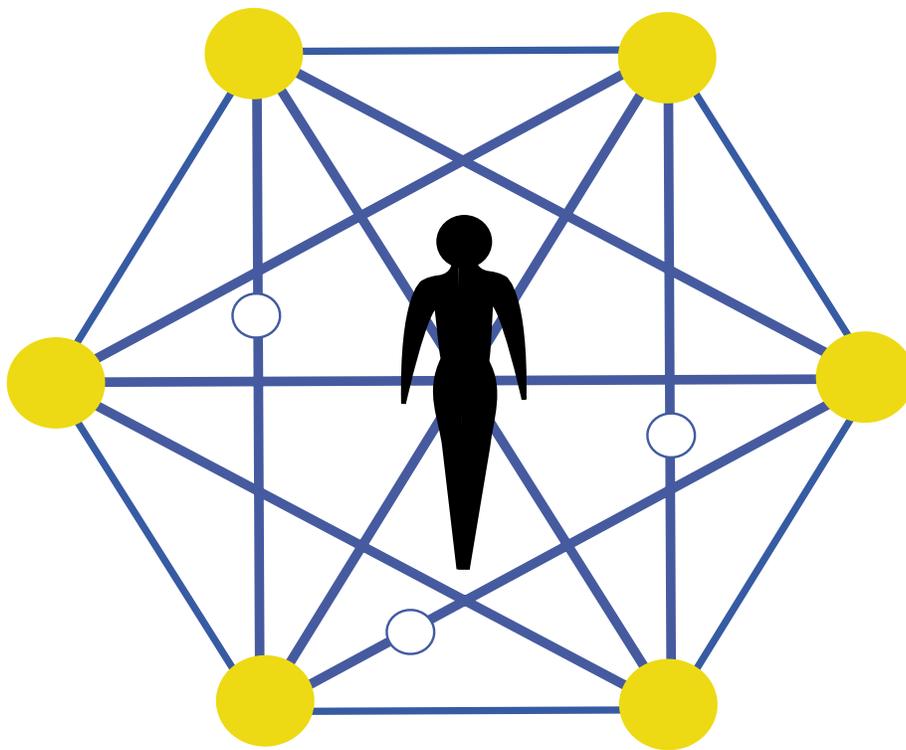
# SUPPLY CHAIN RESPONSES IN A CONSUMER-CENTRIC MARKETPLACE



PEPPERS | ROGERS  
GROUP  
marketing 1to1, inc.



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Institute for the Future/Peppers and Rogers Group

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## **ACKNOWLEDGMENTS**

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## PREFACE

*For the past several years, the Institute for the Future (ITF) and the Peppers and Rogers Group (PRG) have explored two important trends: the growing influence of sophisticated consumers in shaping marketplace dynamics and the impact of rapidly growing information networks on new business opportunities and business–consumer interactions. In the Consumer Direct program, we have explored the evolving direct-to-consumer market and the opportunities it presents for businesses to leverage interactive channels and build one-to-one relationships with consumers. To this end, we have conducted extensive consumer research to identify the key drivers of the consumer-centric marketplace, their role in transforming the supply chain into a demand network, and some of the barriers to this transformation.*

As a result of this work, we have created a detailed picture of a rapidly evolving marketplace where the consumers wield more power and influence by virtue of their access to information and their direct interactions with businesses. In this new marketplace, many new technologies are creating new streams of data and enabling the seamless flow of information between individuals and across organizations and geographic boundaries. Indeed, these tremendous forces are transforming the entire commercial landscape, from the point of interaction with the customer all the way along the supply chain. These forces are influencing the decisions

and investments that manufacturers, suppliers, researchers, and designers must make to stay competitive.

The rapid pace of these changes requires businesses to move with unprecedented speed into this uncharted territory. New systems must be integrated with the old, fundamental business processes must be rethought, and traditional production methods must be redesigned. From the front end to the back end, old supply chain paradigms are being broken down and rebuilt.

Since consumers are at the center of this transformation, businesses all along the supply chain must be sensitive to their needs

and preferences. Information about the customer is becoming the currency of exchange, the source of potential growth and profit generation in a cutthroat marketplace. To be competitive, all business players must establish links—whether direct or indirect—with the end consumer.

As direct links to consumers proliferate through new interactive media, such as online services, mobile devices, interactive radio and television, and so on, a network of suppliers, manufacturers, logistics providers, and distributors will form around the gatekeepers of customer information. Consumer direct (CD) companies and others that maintain a direct relationship with consumers are uniquely positioned to act as these gatekeepers. In response, the rigid, linear metaphor of the supply chain will give way to models that are more flexible and dynamic—transforming from *supply chain* to *demand network*. As real-time information about customer demand replaces the uncertainties associated with traditional forecasts, agile networks that can respond quickly and efficiently to this information will come to dominate.

This report, *Supply Chain Responses in a Consumer-Centric Marketplace*, is built on our extensive understanding of the dynamic changes taking place in the consumer market. Our vision of the emerging commercial landscape relies on the insights of business experts and practitioners grappling with the changes sweeping through the supply chain. This report draws on in-depth interviews with academic and business leaders, including supply chain systems developers, logistics providers,

consultants, product manufacturers, and CD service providers. The report attempts to articulate a holistic view of the fundamental changes taking place, and to provide businesses with a road map for navigating these changes successfully.

In Chapter 1, we discuss the two core drivers of change—consumers and technology. We explore the critical role consumers will play in defining the marketplace, and we examine the evolving technological infrastructure that is enabling new business paradigms to emerge.

In Chapter 2, we explore the comprehensive changes shaping the evolution of the supply chain, all the way from front-end customer functions to back-end supply and manufacturing processes. We discuss the emergence of a demand network that requires collaboration among diverse partners to respond flexibly to the needs of consumers.

In Chapter 3, we take a look at the key barriers companies must overcome to navigate the transformation successfully and emerge as key players in the evolving demand network.

In Chapter 4, we explore the foundation of relationships upon which the demand network will be built and discuss the opportunities that exist for companies to leverage their network of external links to respond effectively and efficiently in this new environment.

And finally, in Chapter 5, we offer strategies for overcoming the barriers presented in Chapter 3, with best practices from current companies that are likely to emerge as key players in the new demand network.

## THE CONSUMER-CENTRIC MARKETPLACE

*Traditionally, when we think about the supply chain, we begin with the suppliers of raw materials, work our way through a long series of manufacturers that bring the product to its final form, and end with the retailer. In today's marketplace, however, the supply chain includes the consumer. Indeed, in the past 50 years, consumers have risen to a dominant position on the supply chain, one once held by manufacturers and then retailers.*

It is these very same manufacturers and retailers that have given consumers the opportunity to play a greater role in the supply chain by offering different options on their products and services, by pushing styles and fashions that change often, by presenting new ways of making purchases, and by giving consumers the ability to co-design products and specify where and when they receive them. In the future, consumers will go as far as being able to dictate aspects of the production process itself.

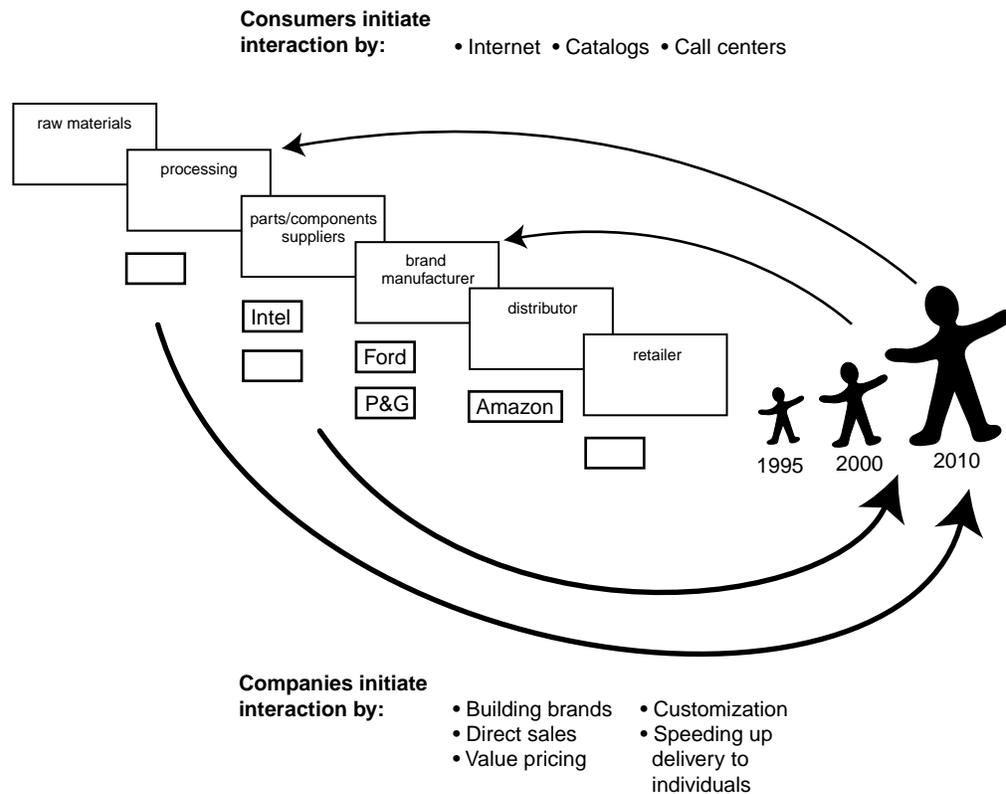
As technologies have empowered consumers to gather information more efficiently, to interact with retailers and manufacturers more directly, and to purchase goods through an increasing number of channels, the competitive nature of business has left companies no choice but to bring consumers into the supply chain. Only then could companies use the consumers' growing empowerment to build more intimate relationships with them, to increase their loyalty, and, in turn, to realize certain process efficiencies,

such as controlling inventory, streamlining logistics needs, and reducing production time. But consumer empowerment also complicates the structure of the supply chain and forces companies to change the way they do business at the most basic levels (see Figure 1-1).

Two key drivers are working to create the consumer-centric marketplace: consumer behaviors and new technologies. Consumers of all types, but especially sophisticated consum-

ers, now have the ability to affect the supply chain in a variety of ways; for example, by increasing their adoption of CD channels and their demand for personalized services and customized products. Likewise, new information and communications technologies that help companies build relationships and networks to facilitate flexible responses to consumer demands will also transform the supply chain in the next decade.

Figure 1-1  
The Evolution of the Supply Chain



Source: Institute for the Future and Peppers and Rogers Group

**CONSUMERS:  
THE KEY TO THE U.S. ECONOMY**

**A**ny discussion of the consumer-centric marketplace must begin with the importance of the consumer to the U.S. economy. Indeed, the American consumer is the heart and soul of the U.S. economy. For at least the last 50 years, two-thirds of GDP has resulted directly from consumer spending. In 2000, in fact, personal consumer expenditures made up 68% of total real GDP.

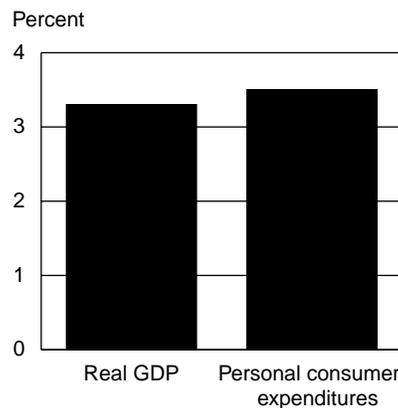
Indeed, for the past ten years, consumer expenditures have made a major contribution to the overall economic expansion in the United States, growing faster than GDP in that time (see Figure 1–2).

Durable goods expenditures on big-ticket items like automobiles and major household appliances—another important indicator of the economic impact of consumers—have also been exceptionally strong in the last decade. These expenditures grew at nearly twice the rate of overall GDP (see Figure 1–3).

The Fortune 50, the list of the most successful companies, provides further evidence of the importance of consumers to the U.S. economy. Retailers that deal directly with consumers, such as Wal-Mart, Kroger, and Home Depot, made up 20% of the top 50 companies in April 2001. Another 40% of the top 50 were not retailers per se, but companies that also interact directly with consumers a good part of the time, for example, AT&T, Bank of America, and Texaco.

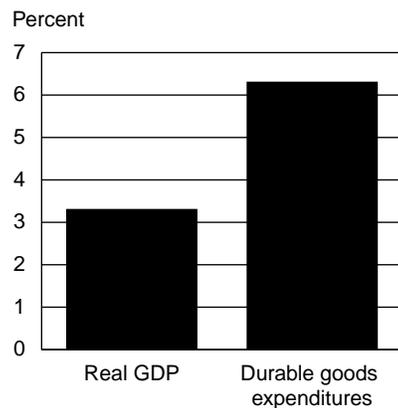
This information all points to one fact: No matter where a company sits along the supply chain, it is impossible—and dangerous—for it to ignore the growing power of the consumer. Consumer impacts on the supply chain have increased over the years, and consumers are

*Figure 1–2  
Consumer Expenditures Grow Faster than GDP  
(Average annual percent growth, 1991–2000)*



Source: *Economic Report of the President*

*Figure 1–3  
Durable Goods Expenditures Are Exceptionally Strong  
(Average annual percent growth, 1991–2000)*



Source: *Economic Report of the President*

poised to have an even greater impact in the next decade as new technologies make it easier for them to have a say in the basic processes all along the supply chain.

### THE TECHNOLOGY INFRASTRUCTURE OF THE CONSUMER-CENTRIC MARKETPLACE

Information and communications technologies are playing a central role in reshaping the marketplace. Companies are deploying these technologies throughout the supply chain, thereby making businesses much more efficient and enabling them to produce a more diverse set of consumer products. The combination of low-cost computing, corporate Internet adoption, and innovative software development is allowing the increasingly diverse sets of supply chain players to work together seamlessly and efficiently to meet the needs of demanding customers. Inexpensive computers and the Internet are now nearly ubiquitous throughout the supply chain, and

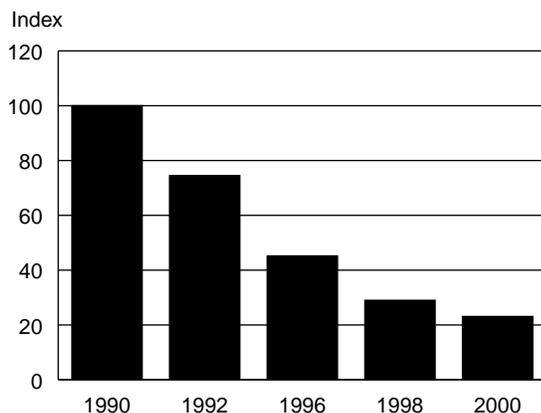
many companies are moving to take full advantage of these important technologies by implementing software applications that manage the vast amounts of complex data flowing through the supply chain.

#### Inexpensive Computers: Breaking Through at the Bottom Line

Computers have proliferated throughout the supply chain in the past two decades because companies are finally seeing the bottom-line benefits of computers, and because the price of computing power has steadily declined (see Figure 1-4). As a result, computers are everywhere. Foremen use them on factory floors, consumers use them in their homes, delivery drivers use them in their trucks, and logistics managers use them in their warehouses. And it won't stop there. The wider adoption of less expensive routers and more powerful servers designed to manage Internet access will continue to drive this trend, as will the increased functionality of wireless devices.

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Figure 1-4  
Price of Computing Power Is Falling  
(Index of prices for computers, 1990-2000)



Source: U.S. Bureau of Labor Statistics

#### The Internet: Connecting Operations

Companies of all types have adopted the Internet, allowing them to take full advantage of the wide base of inexpensive computing power made possible by linking computers and their networks together, which enables information to flow among the players much more quickly and cheaply. In this way, the Internet allows companies to link the activities of their diverse operations around the world so that information can flow reliably and efficiently. The common communication platform the Internet provides also allows corporations to exchange information. This interaction is growing increasingly vital as the supply chain becomes more distributed and less vertically controlled.

Although corporate Internet access is approaching saturation in many segments, it will continue to expand in three main areas. First, it will expand throughout the world as large multinational corporations buy Internet access for their dispersed worldwide operations. Second, bandwidth will increase, such that almost all players in the supply chain will have the high-speed access necessary for data to travel up and down the supply chain in real time. Third, wireless networks will add connectivity to distributed activities, such as delivery and inventory tracking, and will bring cost-saving efficiencies to large facilities, such as factories, warehouses, and retail outlets, where up-to-the-minute mobile data is crucial.

### Software: Optimizing Connectivity

Software applications are vital for taking advantage of the connectivity of computers and Internet access. Companies are developing software to manage and link all parts of the supply chain, but three categories of software development in particular are enabling the transformation of the supply chain: buy-side systems, sell-side systems, and enterprise-wide systems.

#### *Buy-side Systems*

In past years, a tremendous amount of investment went into developing software that connects firms with suppliers of materials, parts, components, and services. The two most important types of software-based systems are:

- *Electronic data interchange (EDI)*. These proprietary, closed systems have existed for years and are now used widely to transmit order information from buyers to sellers. These systems have reduced the need for telephones and fax machines, and thus have lowered the cost of transactions substantially. However,

they rely on the partners to have an established relationship and require them to invest considerable time working together to configure the data exchange system to their specific needs. J.D. Edwards and EDS are leading the way in implementing these technologies.

- *Electronic marketplaces*. Several companies have invested large sums to develop software and establish electronic marketplaces (also called “online exchanges”) on the Internet for the procurement of production inputs. Rather than deal with suppliers individually, as with the other systems mentioned, the purchaser can use the electronic marketplace to survey a range of potential suppliers to compare such factors as price, quality, and availability. While in practice these exchanges have proven extremely difficult to operate effectively—they work better for commodities than for more value-added products—the promise of bringing more efficient markets to procurement is so large it will drive continued efforts to make these systems successful. FreeMarkets, Ariba, and CommerceOne have led the way in developing software to operate such electronic marketplaces.

#### *Sell-side Systems*

Software that manages customer information is allowing firms to better attune their supply chains to consumer demand. These systems help companies manage their relationships with consumers, collect the information necessary to create customized products, and forecast demand more accurately.

- *Customer relationship management (CRM)*. CRM programs enable retailers to aggregate the data they collect about individual consumers and turn that information into knowledge to enhance business processes. Each time a

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**S**oftware that manages customer information is allowing firms to better attune their supply chains to consumer demand.

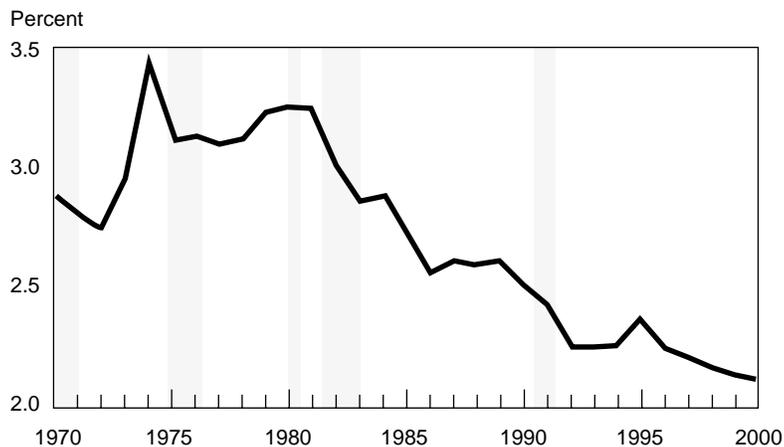
customer comes in contact with a company, such as when one buys an item or visits a Web site, that information is logged and a profile of the customer is built over time. Subsequent communications with that customer use the profile to provide more personalized service. Key companies offering these types of systems include Broadbase, E.piphany, Siebel Systems, and Teradata.

- *Electronic dialogues.* These systems take CRM a step further by automating the interaction with the consumer. Electronic dialogues use information about a consumer to service their inquiries and suggest attractive options and products. (For more on electronic dialogues, see the Consumer Direct report *Personalization: Managing Opportunity and Risk in the Consumer Direct Channel*, April 2001.) Revenio is a particularly interesting company developing these systems today.

- *Forecasting demand.* The data trail created by the proliferation of electronic transactions, both on- and offline, is an incredibly valuable resource that did not exist 20 years ago. Analytical software applications, including spreadsheets, database management systems, and online analytical processing (OLAP) software, are allowing companies to understand their customers better. The knowledge marketers glean using these software programs to analyze data is enabling companies to anticipate demand much more effectively. This ability to predict demand has played a role in dramatically decreasing business inventories over the past 20 years (see Figure 1–5). The range of software applications in this category is very broad and includes a large number of players. Among these, IBM has a strong presence, and Cognos is a leader in OLAP software in particular.

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Figure 1–5  
*Inventories Are Shrinking*  
(Inventories as a percent of GDP)



Source: Institute for the Future; Bureau of Economic Analysis.

### Enterprise-wide Systems

Perhaps the most influential supply chain software programs have been enterprise resource planning (ERP) systems—large programs that integrate disparate functions across an organization. These systems combine buy-side systems, sell-side systems, and internal systems in one single integrated system. ERP implementations require the various business units and departments within an organization to standardize their data so that it can be more usefully shared and easily accessed across the organization. A single ERP system might manage a company’s financial information, accept invoices from suppliers, and send customer order information to a fulfillment partner. By unifying this information in a single system and distributing it in a standard format, organizations can realize significant efficiencies. Departments within companies can access the same pool of up-to-date information and build collaboration into their daily business processes.

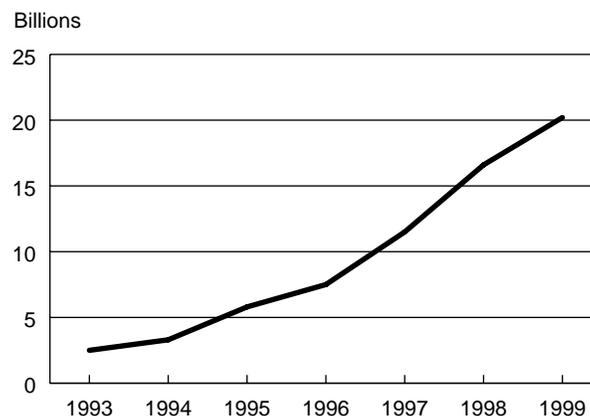
SAP AG is by far the largest vendor of ERP systems. Oracle, the world’s second largest software company, is another large developer of ERP software, and it claims to have saved a billion dollars annually by implementing its own ERP systems. PeopleSoft and Baan are the other major providers of these systems. Most of these companies derive a significant portion of their revenues from the consulting and support services associated with large ERP implementations (see Figure 1–6).

Due to the comprehensiveness of ERP products, these large vendors are making inroads into the more specialized software systems discussed above by developing new products, acquiring smaller firms, and creating strategic alliances. The largest of the software firms, Microsoft and IBM, are entering this arena as

well. With its “.net” initiative, Microsoft in particular is making an effort to sell software services by subscription over the Internet.

Another set of companies makes software modules that can be “bolted on” to existing ERP implementations. These systems can be integrated with ERP systems to share supply chain data with other corporate functions, such as finance and marketing. Whereas traditional ERP systems focus on a company’s internal functions, these supplemental systems incorporate information from external sources to help managers make supply chain decisions. Supply chain management applications developed by Manugistics and i2 Technologies, for instance, attempt to optimize production and logistics activities. For example, these tools allow companies to take a manufacturing schedule produced by an ERP system, compare it to a database of real-time bids from suppliers, and identify the optimal supplier, length of contract, and method of transportation.

Figure 1–6  
ERP: Large and Growing  
(U.S. ERP software market revenues, in billions of dollars)



Source: AMR Research

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**T**he direct influence of the consumer is appearing at more places along the supply chain.

### *Future Software Technologies*

Despite the billions of dollars spent on proprietary solutions and customized implementations in the past decade, these systems are relatively immature and offer opportunities for significant improvement. For the most part, they still are not capable of handling the complexity of everyday transactions. These software programs also struggle with their own internal complexity and their ability to interface with other systems. Future transformations of the supply chain will be driven by improvements in these types of software applications and by managing their increasing complexity. Beyond improving existing software, the most significant innovations will occur in the creation of software programs that can work seamlessly with other programs for instant ad hoc data queries and exchanges.

In the next decade, improvements in software programs will continue as a critical driving force of change in the supply chain. Much of the efforts to improve software will go toward creating new interfaces and programs that better manage the complexity of seemingly simple buyer-supplier transactions. Designing software that can cope with the proliferation of standards and formats that make integrating partners difficult and expensive will help enable changes in the supply chain as well. In fact, most of the business leaders we interviewed in our research mentioned this Tower of Babel-type problem as a key barrier to integrating systems.

The next generation of supply chain software will come from programs that take advantage of innovative computer programming languages that enable software programs to be used in new ways. Extensible markup language (XML) is a programming standard that allows

software programs to interact with other software programs over the Internet. Rather than buy software to manage certain supply chain tasks, for example, companies may instead access a central service, called a “Web application server,” that accesses a network of software programs and servers that accomplish tasks such as bid-pricing, financial transactions, and contract negotiation. These types of solutions may be more flexible, and thus, ultimately, more preferable to the efficient but inflexible ERP systems that perform these tasks today.

### **THE SUPPLY CHAIN RESPONDS TO SOPHISTICATED CONSUMERS**

**C**onsumers in general and sophisticated consumers in particular—those who are more educated, more affluent, and more infotech savvy—are shaking up the power structure of the supply chain with their interests and concerns. These consumers want more choices, more control, better value, wider accessibility, and greater comfort. To these ends, they are learning to use a variety of information resources that increase their ability to influence the system. Indeed, they are able to utilize new information technologies such as the Web to search across much wider selections for the products and services they want. In this way, they can bypass local stores to search for brands and products on a national or an international scale. They readily find a greater variety of information describing the characteristics of products they like, and the best ways of acquiring them.

The direct influence of the consumer is appearing at more places along the supply chain. In turn, smart players along the supply chain are looking for ways to connect with these new powerbrokers more directly.

### The Rise of Consumer Direct Shopping

One trend that's transforming the supply chain is the increase in remote shopping. Consumers are buying more goods outside stores—that is, by means of CD channels. In the past few decades, the share of total sales outside stores accounted for about 4% of all sales of retail goods, mostly through mail-order catalogs and direct mail ads. In that time, the CD channel's share of total sales stayed relatively flat. In recent years, however, with the rapid growth of e-commerce, the share of CD sales has grown, reaching nearly 5% in 2000. It could grow to 8% by 2005.

Sophisticated consumers are more likely to be CD shoppers. An IFTF/PRG household survey found that sophisticated consumers are far more likely than traditional shoppers to have bought from a catalog or online channels in the last year (see Figure 1–7). This means that the most sophisticated and demanding

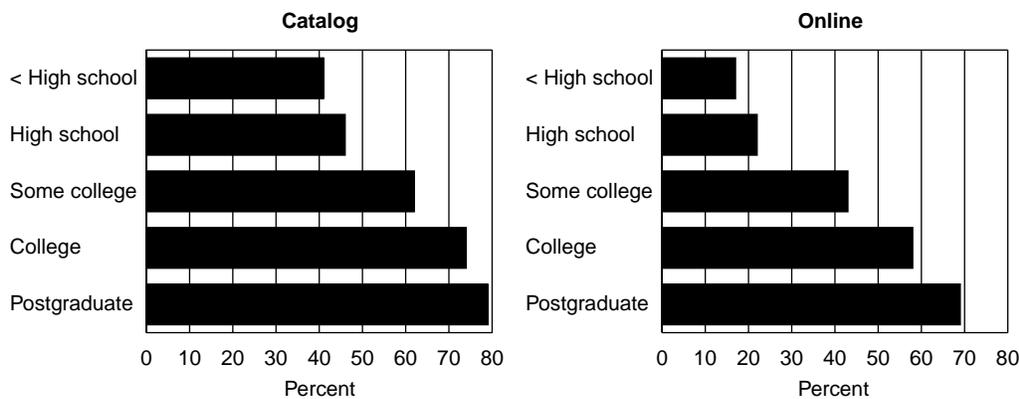
consumers are also the consumers who will have the most opportunities to interact with companies and influence the supply chain.

#### *Interacting More with Supply Chain Players*

Remote ordering and delivery systems that bypass the retail link in the supply chain open up the possibility of direct contacts between producers and consumers. That's not what's really happening, however. In actuality, new sets of intermediaries are appearing in place of the old ones. New e-commerce Web sites, Web sites controlled by existing retail chains, and new service delivery firms are all emerging to provide links between the consumers and the products they buy.

But whether the connections are direct or indirect, these players and their relationships with the consumers are making many of the players farther along the supply chain—brand manufacturers, suppliers, logistics firms, and information database firms—more sensitive

**Figure 1–7**  
*Sophisticated Consumers Are More Likely to Be CD Shoppers*  
(Percent of households that shopped from catalogs or online in the past 12 months, by education\*)



\*We use education here as a proxy for consumer sophistication.

Source: Institute for the Future/Peppers and Rogers Group, *Supply Chain Responses in a Consumer-Centric Marketplace*, U.S. Household Survey, December 2000.

**Mass customization is a challenging proposition for companies, but in the long run, companies will find that mass customization not only increases customer satisfaction but also helps eliminate their inventories of fixed goods.**

to how and when consumers order their goods, and when and where they expect delivery. This growing awareness of the needs and activities of consumers is transforming the supply chain from top to bottom.

#### *Dictating Delivery Location and Timing*

When consumers buy products through CD channels, they can dictate where they receive products: at the retail store, home, work, and designated pickup locations. Consumers can also dictate delivery times, ranging from standard three- to seven-day service, express service of one to two days, or even next-day service.

All in all, consumers are interested in getting the products they want when and where they want them. Players along the supply chain that can bring products to market quickly will increase their market share, especially in the areas where styles change quickly—such as clothes and accessories—or when timing is essential—such as gifts for special occasions and pharmaceuticals. The ability to deliver the item to the right location, from a list of options, is imperative for success.

#### **The Rise of Mass Customization**

The Internet and online shopping have increased the possibility of mass customization. The online shopping channel gives consumers an easy way to interact with companies and provide the information required for mass customization. Companies like Levi's, Dell, Customatix.com, Creo Interactive, and Interactive Custom Clothes offer customized products, placing the consumer in control of important decisions along the actual manufacturing part of the chain.

Of course, the opportunity to customize doesn't mean much if there is no demand for it. This isn't a problem. Consumers today are showing an interest in customized goods. For example, Dell Computer, provider of mass-customized computers, recently overtook Compaq as the leading seller of PCs. Reflect.com, the customized beauty product e-tailer, has been succeeding while beauty sites that sell noncustomized products struggle. Reflect's sales have increased steadily since its launch last year, with an average of half a million visitors each month. Up to 50% of sales come from repeat buyers.

Mass customization is a challenging proposition for companies, but in the long run, companies will find that mass customization not only increases customer satisfaction but also helps eliminate their inventories of fixed goods. Build-to-order production decreases cycle order times, eliminates engineering's involvement in supporting order demand, and enables the engineers to engage in more value-added activities such as verifying the technical capability of combinations of mass-customization modules. Customization also improves margins, since customized products do (and will likely continue to) command a premium price.

#### **CONSUMERS ARE RESHAPING THE SUPPLY CHAIN**

**I**n the longer term, consumers will have an even deeper impact on the supply chain. They will soon move beyond simply designing products through mass customization to dictating which types of materials are used, and even which suppliers take part in the production of goods.

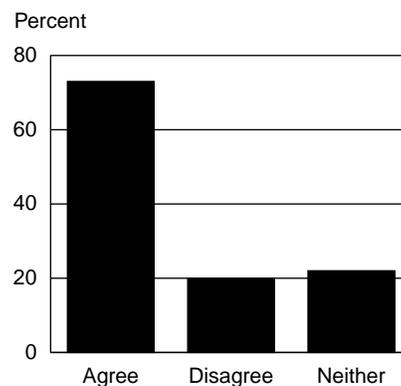
Imagine, for example, consumers demanding that only recyclable materials be used in the products they buy, or that only suppliers that employ environmentally friendly practices or have strong family-friendly labor policies be used. Although consumers might not pay a premium for such a say, meeting these demands may very well become competitive advantages that differentiate certain companies from their competitors.

This notion is not that far-fetched. There is evidence that consumers are willing to invest more money in companies they consider socially responsible. In fact, the Social Investment Forum reports that socially responsible investors were the fastest-growing U.S. investor group between 1997 and 1999, with \$2.16 trillion in funds screened for social concerns in 1999, nearly four-fifths of which was specifically channeled to firms that don't harm the environment. More demanding and information-savvy consumers could very well increase their support for these environmentally and socially responsible companies by insisting that the companies they purchase products from use them as suppliers. For example, one survey in Europe found that nearly 75% of respondents are willing to pay a small premium for products and services from a company they feel contributes to the greater good of society (see Figure 1-8).

Although consumer demand driven by such noble causes as the environment and social justice may be limited, there are early signs that consumers place value not only on the brand and image of the product manufacturers but also on the brand and image of the suppliers of component parts to those manufacturers. Witness the value of the "Intel Inside" campaign when it comes to PC sales.

Intel's campaign is not an isolated or recent development. Players along the supply chain have been actively promoting their goods directly to consumers since the 1970s. For example, Cotton Inc., the entity behind the slogan, "Cotton, the fabric of our lives," was formed in 1970 to promote the use of cotton to consumers. The industry was facing a crisis—it had seen the share of cotton apparel and home fabrics drop precipitously, from about 78% of all textile products sold by retailers in 1960 to an all-time low of 34% by 1975. Cotton Inc.'s mission is to ensure that cotton remains the number one choice among consumers. This mission seems to have been accomplished; of the three major categories of consumer textile consumption (apparel, home furnishings, and floor coverings), cotton maintains a dominant position, and is used in more than 50% of

*Figure 1-8  
Financial Support for Responsible Businesses  
(Percent of respondents who say they would be willing to pay a little more for products from socially responsible companies)*



Source: The Future Foundation/BT, 2000.

apparel and home furnishing products (see Figure 1-9).

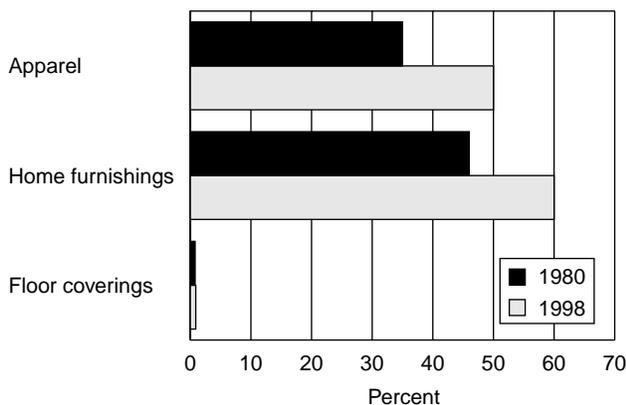
Other companies have promoted their component products directly to consumers as well, including DuPont, which pushed its synthetic fibers in the 1970s; Siemens, a provider of turbines and power engines (hardly consumer goods!), which launched its “We Can Do That” campaign in radio, print, and television in 1998; and BASF, whose current slogan is, “We don’t make a lot of the products you buy, we make a lot of the products you buy better.”

More recently, we have seen the big pharmaceutical companies reach out to consumers in their marketing efforts. In addition to their traditional sales to physicians, pharmaceutical companies now market directly to consumers, with such products as Claritin (Schering-Plough), Viagra (Pfizer), and Xenical (Roche

Laboratories). Indeed, spending on direct-to-consumer advertisements for pharmaceutical products in 2000 approached a quarter-billion dollars. This effort by drug manufacturers to reach consumers directly has been tremendously successful. Consumers are now asking doctors for specific prescription medications by brand name rather than just asking for something in general to help alleviate their symptoms. Perhaps as a result, Pfizer, Aventis, and Schering-Plough, three large pharmaceutical companies that manufacture popular allergy remedies, generated \$4.7 billion in sales last year. As more component manufacturers put their components on display for consumers à la Intel and Cotton Inc., and other supply chain players increase their efforts to communicate directly with the public, consumers—especially the information-empowered ones—are likely to respond by

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Figure 1-9  
Cotton Gains Market Share through Direct-to-Consumer Communication  
(Percent of end-use cotton consumption in selected consumer products)



Source: Fiber Economics Bureau, Inc., *Textile Organon*.

demanding that those parts be included in the products they buy, thereby having an impact farther back along the supply chain than ever before. This will create opportunities for suppliers of original equipment manufacturers (OEMs) to establish a much stronger presence in consumer markets.

Not only does the increasing visibility of suppliers open the door for consumers to affect traditionally distant points on the supply chain, but it also underscores the importance of strategic partnerships and relationships among manufacturers, suppliers, and other players along the supply chain. We will discuss these relationships in more detail in Chapter 4, but these examples demonstrate that consumers could very well have a say in which suppliers a company chooses to work with. The choice of suppliers may eventually gain as much influence as other key inputs like price and service.

#### CONCLUSION:

#### A TRANSFORMED SUPPLY CHAIN

**G**rowing consumer power and the proliferation of new technologies are driving the transformation of the supply chain. At every point along the supply chain, direct customer interactions are creating new information streams that feed into a powerful new technology infrastructure. These two forces are breaking down the old metaphors describing the interactions that take place in the commercial marketplace. Key lessons to keep in mind include:

- *Develop links to the consumer.* As consumers exert more influence in shaping marketplace dynamics, players that have established links to the consumers, whether through direct interaction or through partnerships with companies that own data about the consumer, will have a competitive advantage. Companies should make investments in technologies and strategic partnerships that will enable these crucial links.
- *Leverage technology to enable real-time information sharing.* As the infrastructure of powerful new information technologies emerges, businesses will be able to reduce uncertainties about shifting demand by relying on real-time information. The flow of this information across organizations will enable more efficient responses in a consumer-centric marketplace.
- *Utilize information to respond to individual needs.* As companies implement processes for sharing real-time information with partners and suppliers, they will be able to create a more complete picture of individual consumers. Developing strategies for responding to consumers at an individual level will be a key to success in this new environment.

The next chapter will discuss the impact of the two key drivers discussed in this chapter, consumer behaviors and new technologies, on reshaping the *supply chain* into a flexible *demand network* that is increasingly sensitive and responsive to consumer needs.



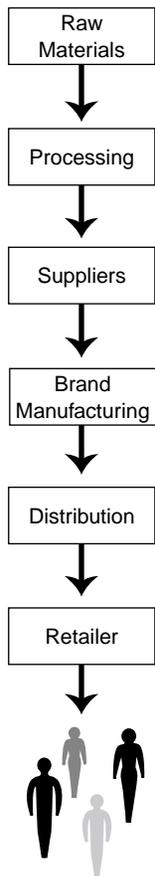
## FROM SUPPLY CHAIN TO DEMAND NETWORK

*The changing demands of consumers and the proliferation of information and communications technologies are transforming the supply chain into a network of partnerships. As consumers gain increasing influence in the marketplace, they are transforming the supply chain, forcing firms to restructure production processes to accommodate their demands for more differentiated products. As a result, all parts of the supply chain—from manufacturing to distribution—are likely to change in the next decade.*

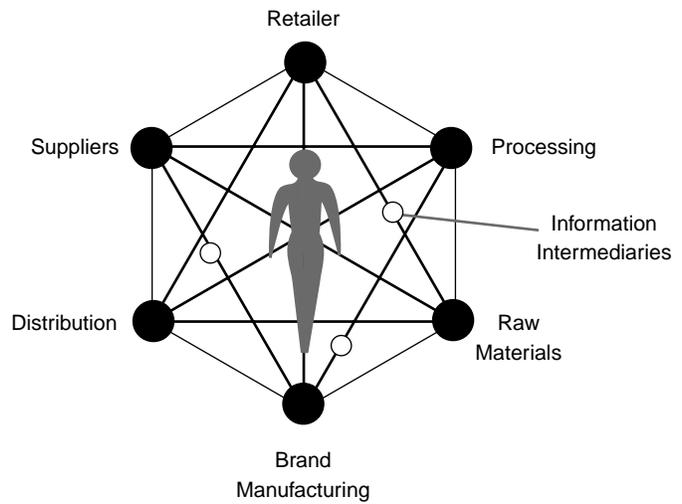
*Some of the most important transformations will occur in the parts of the supply chain farthest from the consumer. Consumers are having an indirect but important effect on product design and R&D, for example. These changes in the supply chain will affect the very nature of companies up and down the chain. They will no longer simply be parts of vertically integrated hierarchies, but they will become nodes or links in horizontal networks of specialists. In this way, the value of partnerships will increase throughout the new “demand networks” (see Figure 2–1 on page 16).*

Figure 2-1  
From Supply Chain to Demand Network

**Traditional supply chain:**  
Supplying the mass market



**Evolving demand networks:**  
Meeting individual needs



Source: Institute for the Future and Peppers and Rogers Group

### A TIMELINE OF CHANGE: WHICH INDUSTRIES WILL BE AFFECTED MOST?

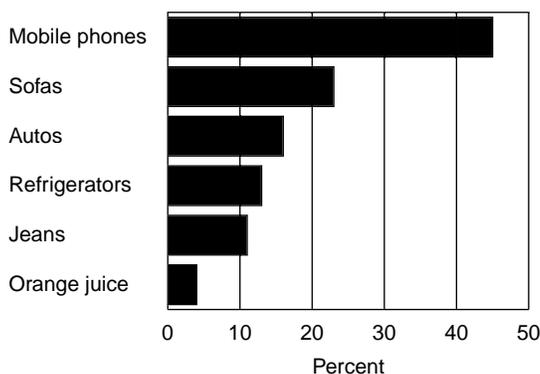
Firms are offering more personalized services and customized products, and this strategy will have far-reaching consequences on the new demand networks, forcing entire industries to change. Some industries will change more quickly than others.

Our research with supply chain experts and a cross-section of consumer-oriented industry representatives indicates that a few industries are riper for customization than others. In considering a sample of six product categories, respondents indicated that the consumer electronics market is likely to experience the most customization in the next five years. Within the consumer electronics segment, for example, we forecast that 45% of mobile phones will be customized by 2005 (see Figure 2-2). Rapidly evolving technology and a demand to simplify the devices' features based on individual consumers' patterns of use will be the key drivers.

The customization trend will also affect other industries, like pharmaceuticals and biotechnology. Advances in genetic profiling will enable pharmaceutical companies to manufacture drugs specifically designed for individuals with certain conditions. As a result, drugs tailored to meet the needs of very small groups—close to the level of the individual—will come to market between 2008 and 2010. Drugs designed for larger groups of genetically identified, at-risk populations will come to market even sooner, between 2004 and 2006. Because it takes two to three years to design, construct, and obtain regulatory approval for a new pharmaceutical plant, pharmaceutical companies are planning for these changes now, and are already making the necessary investments in R&D and infrastructure.

The convergence of genetics, pharmaceuticals, and food could have dramatic implications on food production soon after these changes take hold in the pharmaceutical industry. First, this convergence will promote

Figure 2-2  
Mass Customization in 2005  
(Percent of market for each product that will be customized in 2005)



Source: Institute for the Future, Corporate Associates Program Annual Conference, 2001.

consumer interest in customized foods. Second, food production will entail more value-added processes and will become more capital intensive. As a result, fortified foods and nutritional supplements will become increasingly customized between 2004 and 2007 (see Figure 2–3).

Big-ticket household appliances and products such as refrigerators and furniture are also likely to become more customized—though to a lesser extent than consumer electronics and drugs. The standard high purchase prices of these products make consumers less likely to balk at the fees associated with a greater degree of customization, in terms of fabrics, sizes, and delivery times and places. Automobiles and apparel are less likely to see far-reaching customization, with neither category expected to surpass the customization of 20% of sales by 2008. In the longer term, however, from 2010 to 2015, we expect to see up to 30% of automobiles customized to some degree.

Consumers will be able to make cosmetic changes to their new cars as well as changes to safety features, fuel efficiency equipment, and so forth. Potentially, this degree of customization could alter a large segment of the automobile manufacturing industry.

### CONSUMERS TRANSFORMING THE SUPPLY CHAIN

For this type of customization to occur in each of these industries, the supply chain will have to change significantly. Such a transformation will build on the major changes of the past that have already brought a degree of efficiency and flexibility to the supply chain today.

Since the Industrial Revolution, the supply chain has evolved through a series of innovations. In the early 1800s, steam power and mechanization allowed firms to substitute capital for labor. The advent of the railroads at the turn of the century created a transportation revolution that allowed the supply chain to operate efficiently over long distances and led to the rise of very large organizations. The Taylorist production methods of the 1920s, exemplified by work on the Ford Model T, brought mass production and scale efficiencies to consumer product manufacturing. The rise of information technologies in the 1970s led to the development of a burgeoning service sector built on data processing.

The growing influence of consumer demand is poised to create the next restructuring of the supply chain and will drive significant changes for the coming 30 years. Consumers are affecting nearly all parts of the supply chain, from the customer-oriented functions in marketing and distribution all the way to R&D. They will bring important changes to the cen-

Figure 2–3  
Mass Customization Timeline

2005	2005: 45% of mobile phones
	2006: Drugs designed for genetically indentified, at-risk populations
	2007: Customized, fortified foods and nutritional supplements
	2008: Less than 20% of auto and apparel categories customized
2010	2010: Drugs tailored to meet needs of very small groups
2015	2015: Up to 30% of autos customized to some degree

Source: Institute for the Future and Peppers and Rogers Group

tral core of the supply chain—manufacturing—where firms source inputs, produce components, and assemble final products. Ironically, the part of the supply chain that is farthest from consumers, R&D, may play the most important role in transforming the supply chain into a more consumer-centric network of partners and suppliers that is increasingly sensitive to customer demands.

### **Marketing: Making First Contact with Customers**

As consumers have become more empowered by their use of interactive technologies, and mass media has divided into narrower channels, companies have had to rethink the way they communicate with an increasingly fragmented customer base. Indeed, the new streams of information about consumers that have been collected by means of new interactive media are influencing activities all along the supply chain. The impact of this information has been far-reaching, even encouraging players in the back-end of the supply chain to communicate more often with consumers both directly and indirectly.

#### *Reinventing Customer Relationships*

As new interactive forms of communication with consumers take the guesswork out of anticipating their demands, players all along the supply chain have the opportunity to engage consumers at different levels. Through every interaction—every point of contact with the customer—businesses have the opportunity to build trust and deepen their relationship with customers by increasing the value of their products and services. The greater the number of interactions, the more chance a company has to deepen the relationship.

In this way, those businesses that have the most direct contact or the greatest number of interactions with consumers have the opportunity to learn about the unique needs of consumers and transform the nature of the business–consumer relationship. For example, a retailer can become more than merely the supplier of goods and services. Indeed, a retailer can become an agent that partners with and acts on behalf of the consumer to fulfill a wide variety of needs. Home Depot is making such a move, expanding beyond its traditional role as a provider of home improvement products to provide a full suite of services for consumers, including interior design services, access to contractors, and financial loans. Moreover, other businesses along the supply chain that have not traditionally had direct contact with consumers, such as components suppliers, product manufacturers, and food producers, now have more opportunities to establish a branded relationship, to communicate directly with customers, and to play a more direct role in driving demand for their products.

#### *Redefining Brands*

As the ability to tailor messages for individual consumers and to customize goods and services to respond directly to consumer needs becomes possible, marketers will have opportunities to define their brands in new ways. In the old world of mass production and mass-market media, the function of a brand name was to convey trust and consistent quality. This worked well in the past when consumers were concerned about reliability. Brands helped set and reinforce consumer expectations.

Quality has now become a starting point for most consumers, however, not the end goal. The ability to customize adds a new dynamic

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**T**hrough every interaction—every point of contact with the customer—businesses have the opportunity to build trust and deepen their relationship with customers by increasing the value of their products and services.

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**Quality has now become a starting point for most consumers, however, not the end goal. The ability to customize adds a new dynamic element to the marketing mix.**

element to the marketing mix. Key components of the product may be standardized, but the focus of consumer value will be on the aspects of a particular version or the associated services that make the product unique.

For example, 90% of a customized mobile phone may be the same for each customer. Each phone may contain the same fairly reliable and trusted circuitry, antenna, and battery. However, the key value-added components will be the features that make the product different from the standard issue—perhaps a customized keypad, a personalized user interface, or the color of the faceplate. Marketers will have to use new techniques to communicate both the value of the quality of the platform technology and of the variability of the customizable components. Marketing for these types of products may revolve less around the attributes of the devices themselves, which will vary, than around their functionality—that is, what they can do and how they can enhance consumers' individual identities or fulfill their needs, one to one.

#### *Optimizing Pricing*

Information streams generated from interactive marketing efforts will enable the pricing of products to become much more precise as more meaningful data informs pricing decisions from two directions.

First, new technologies—most important, the CD channel itself—will allow marketers to learn more about each consumer. Gathering information that is an integral part of the customization process will give marketers a much more complete profile of each customer—for example, how the customer uses the product, what role the product fills in a

customer's daily life, and so forth. CRM technologies will play an important role in aggregating this information and deriving meaningful conclusions from it, thereby enabling companies to respond appropriately to each customer. All of this information will allow marketers to get a better handle on how much each consumer is willing to pay for a given product or a service.

Second, information from the sourcing end of the supply chain will enable marketers to better integrate supply costs into pricing decisions in real time. As markets for inputs become more dynamic, incorporating the input prices into product prices will become increasingly important. Firms can optimize their revenue by using detailed information about the various costs of components of their supply chain to determine pricing for each small batch of product.

#### **Distribution: Leveraging Direct Links to the Customer**

The increasing demand for more customized products will bring significant changes to the process of getting goods into the hands of consumers. Three major players will be affected by these changes: retailers, logistics services, and warehouses. Retailers, the owners of the customer interaction and the keepers of valuable information about consumers, must continually reinvent themselves in response to the dynamic needs of their customer base to stay competitive. Logistics and warehousing will evolve, albeit slowly, to meet the demand for smaller batches of products moving more quickly over longer distances. They will also become more integral to all supply chain processes.

### Retailers

Retailers have had a long history of reinventing themselves in response to a more competitive environment caused by such developments as new relationships with product manufacturers and new technologies. Whereas retailers' innovations in the past were primarily based on changes in their competitors and suppliers, the current wave of change is driven by consumers as they learn to use new interactive technologies and information in more sophisticated ways to make informed purchasing decisions (see sidebar, "Zara: Fast Responses to Rapidly Changing Consumer Demands," on page 22). For example, the expansion of the CD channel is causing retailers to rethink their use of space. Bricks-and-mortar stores are being used to better emphasize the intrinsic advantages of store shopping—experimentation, selection, face-to-face interaction, and entertainment—and to decrease the negative attributes—hassles, far-off parking, crowding, inconvenience, lack of information, and limited selections.

As a result, look for stores to offer radical new looks and an increasing range of services and features as they integrate interactive technologies into store formats and apply lessons learned from the CD channel. Grocery stores, for example, may be built on the convenience store model, offering spaces designed for new products and experimentation, more ways for customers to communicate (e.g., interactive tools such as online services or mobile devices), specialized clerks, and shorter and fewer lines. (For more information about retail innovations, see the Consumer Direct report *Forecasting the Consumer Direct Channel: Business Models for Success*, 2000.)

### Logistics Services

As customization occurs on a global scale, and production batches become smaller, logistics operators will become more important players in the overall production process—they will be the key to enabling the movement of small packages very quickly over large distances. In this way, logistics will become intertwined with production. Therefore, manufacturing and assembly plants must be redesigned to move small batches more often. One way to do this is to connect large manufacturing plants to air cargo transportation hubs. Cargo-only air facilities, such as those at Alliance Airport in Fort Worth, Texas, and Rickenbacker International Airport near Columbus, Ohio, will become attractive locations for production plants. Nokia, for example, has located one of its major North American assembly plants adjacent to the Alliance Airport. Expect more of these cargo-only facilities to emerge as regional production centers grow.

### Warehouses

As part of this increasing demand for nimble logistics systems, warehouse space will be transformed into a much more active component in logistics operations rather than function merely as a huge box for passive storage. Inventories will continue to fall and warehouses will be used increasingly as quick trans-shipment centers—high throughput distribution will become pervasive, perhaps even with value-added production introduced at warehouses. On-tarmac facilities, in which space is rented by the hour for the continuous rapid movement of small batches of goods, are harbingers of how warehouse space is likely to be used in such an environment.

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**T**he current wave of change is driven by consumers as they learn to use new interactive technologies and information in more sophisticated ways to make informed purchasing decisions.

Other warehousing models will emerge to fulfill distribution needs along the final mile as well. Neighborhood consolidation and fulfillment centers will offer a cost-effective way for delivery companies to aggregate the flow of products into households. Such fulfillment centers will accept deliveries from a variety of different companies, thereby bringing together all of a household's purchases for local delivery.

### **Manufacturing: Consumers Are Reshaping the Core of the Supply Chain**

The switch to more customized products will have significant impacts on the core of the supply chain where manufacturing occurs. Demands for more customized goods will transform manufacturing by creating shorter product life cycles, and thus shorter production runs. Batches of identical products will

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### **Zara: Fast Responses to Rapidly Changing Consumer Demands**

**Z**ara, a clothing retailer based in Spain, provides one of the most unique and compelling examples of the new dynamic retail format. Zara designs and manufactures low-cost fashions for women and sells its collections through its own retail stores.

The company keeps an extremely close watch on the rapidly changing consumer demand for fashion apparel. Trend-spotters monitor fashion magazines, television, and trendy locales to find the latest fashions. This information, as well as sales data from the retail outlets, goes directly to Zara's designers, who work on-site at the manufacturing facility.

As soon as a promising fashion is identified, Zara's quick-response supply chain goes into action. The clothing company can design, manufacture, and distribute a new collection in six weeks, whereas its competitors average about nine months to do the same. Once a new collection reaches the stores, each item remains on the shelf for no more than a month. By turning over the selection so rapidly, and by producing 10,000 new designs a year, Zara keeps its selection fresh and appealing. Zara has redesigned its supply chain to fit the rapidly changing demands of its fashion-conscious customers.

become smaller as consumers increasingly demand differentiated offerings and marketers respond to information about customers with increased segmentation and customization. Successful manufacturers will have to find ways to redesign their production facilities so they can meet this demand for customization, while at the same time retaining the efficiencies associated with scale. Not an easy task.

Information technology helps to accomplish this task, by enabling production to be altered easily and continuously. Information technologies enable more agile production by bringing information on changing demand directly to the production site. For example, Cisco Systems accepts orders on its Web site and sends them directly to the factory floor of its manufacturing partner, Flextronics, so that manufacturing begins as soon as the order is received. This model will become a standard for agile manufacturers.

The manufacturing segment of the supply chain has three components: production, input sourcing (procurement), and final assembly. And though these steps have different meanings in different industries, the fundamental changes to each will have generally similar effects in those industries where customization is likely to grow.

#### *Mass Customization in Production*

A key challenge in designing a supply chain that can produce the customized products consumers are increasingly demanding is to make the transformation in such a way that producers can retain the efficiencies created by mass production. Caught between consumers' demands for customized products on the one hand and low prices on the other, firms are searching for ways

to achieve scale. Mass customization has emerged as a way to resolve this apparent contradiction. Some of the key methods for achieving efficient customization include:

- *Modularization.* Modularization consists of standard component parts—modules—that fit together to create customized final products. The modules are combined in different ways based on the customers' specifications. In this scheme, customization occurs in the final assembly process. For instance, General Motors (GM) launched a bold experiment in redesigning the automobile manufacturing process when it opened its Blue Macaw facility in Brazil in July 2000. Officially known as the Gravatai Automotive Complex, this state-of-the-art plant, which has become a blueprint for new automobile production facilities around the world, enables sophisticated methods of modular assembly and is designed to support an online system for designing customized vehicles and selling them directly to consumers through the Internet. The plant is designed to produce the Chevrolet Celta, a 1.0-liter hatchback that features 20 combinations. This level of customization allows GM much better control over inventories and better production-planning capabilities (see sidebar, "Blue Macaw Breaks Through Ford's Model T Paradigm," on page 25).

- *Component standardization.* Ironically, a key enabler of customization is the standardization of components so that parts and pieces can fit together in new ways, even from company to company. As more and more of components manufacturing is outsourced, suppliers are producing products for many different customers. As a result, brand manufacturers are working with components suppliers to

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**Caught between consumers' demands for customized products on the one hand and low prices on the other, firms are searching for ways to achieve scale.**

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**Customization—  
of both products  
and services—  
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direct  
collaboration  
with the  
consumer.**

figure out which components can be used by more than one manufacturer, so they can be produced less expensively. For example, the world's largest supplier of disk drives for personal computers, Quantum Corporation, works with its customers, Apple, Compaq, and Dell, to agree on disk drive designs that can be used by all of them. By collaborating on design in this way, Quantum's "Generic Drive Program" provides less expensive components. The computer manufacturer can then use this standardized component along with other components to create a differentiated and potentially customized end product. By delaying the customization until near the end of the manufacturing process, many of the efficiencies of mass production can be retained.

- *Platforming.* Under this method, a basic structure, or platform, is created that can be used as the foundation of several different products, which are created by adding different components. Volkswagen has been very successful in creating a single platform on which to build several of its best-selling models. The VW Golf, VW Beetle, and Audi TT use the same frame, chassis, and basic components, for example, although the cars are very different in appearance and are marketed to very different consumer groups.
- *Self-customization.* Some manufacturers are experimenting with ways to create products consumers can customize themselves. Mobile phones offering detachable faceplates with different designs and colors are an early example. There is a significant opportunity for companies to gain competitive advantage by other simple forms of self-customization. For example, Sprint PCS offers a voice-recognition speed-dial service to its customers, which

both gives the customers a convenient way to make calls on the run and helps the company build customer loyalty. Because customers spend time recording contact names and entering other information into the system, there is little incentive to switch to another service, even for a reduced price. Similarly, consumers can go to a local hardware store and work with a salesperson to mix paint to their exact specifications. Stores that keep a customer's particular formula on file can remind the customer when the time comes for a new paint job, thus empowering consumers' self-customization efforts and enhancing the value of the customized offering.

An important concept in all these attempts to realize the benefits of mass customization is that of "postponement." Manufacturers are designing production so that the actual customization of each product happens as late in the manufacturing process as possible. Other companies are designing customized services to increase the value of standard products. In this way, a greater proportion of the steps involved in production up front are standardized and take advantage of the efficiencies associated with scale. Customization—of both products and services—will be most successful when performed in direct collaboration with the consumer.

#### *Dynamic Procurement*

The growth in demand for customized products, coupled with the continuing trend toward outsourcing, will make procurement of the inputs to production—raw materials, parts, and components—a critical element of the supply chain. Outsourcing will increase both the amount of inputs that need to be purchased and the

### Blue Macaw Breaks Through Ford's Model T Paradigm

The Blue Macaw project in Brazil brought together GM and 16 auto parts suppliers, including Lear, Delphi, and Goodyear, in an unprecedented collaborative effort. Not only did these various players work together closely in designing and engineering the Chevrolet Celta, which is sold mostly in Latin America, but they are also colocated in an industrial park in Gravatai, Brazil, and are key investors in the plant itself. In fact, of the total \$554 million cost of the Blue Macaw plant, GM contributed \$360 million, with suppliers contributing a collective \$117 million, in addition to about \$77 million in government incentives. This strategy of collaborating with outside suppliers enabled GM to lower its investment costs way below the \$1 billion automakers once spent on new production facilities.

Another partner, TNT Logistics, designed the process for the efficient flow of materials through production, in order to maximize the efficiencies of having suppliers on-site. Tow tractors maintain an even flow of materials between supplier plants and the GM assembly line. Modules manufactured by suppliers ship each half hour or so, keeping assembly lines continuously stocked with the necessary

quantities. GM hopes to improve annual production rates beyond the industry average of 30 to 50 vehicles per worker, to more than 100. This represents an ambitious attempt to bring profitability to the low-margin small-car market, with a vehicle that sells for \$8,000 or less.

#### Selling Customized Vehicles Direct to the Consumer

Consumers can access the Celta Web site either through a home Internet connection or at a kiosk located at a GM Brazilian dealership, where they can shop, view information about the factory, see the car, configure a customized vehicle, place an order, and even finance the purchase (see Table 2-1).

Celtas became available in September 2000, and by early 2001, GM reported the sale of 24,000 vehicles, with 64% of sales transacted via the Internet. GM can deliver most custom-built Celtas from the factory to the dealership within 11 days, and is hoping to reduce delivery time to as little as four days by setting up a network of five distribution centers throughout Brazil, which would eliminate several days of transit.

Table 2-1  
Purchasing a Customized Celta—Easy as 1, 2, 3 ...

- Step 1: The buyer fills out a personal data form.
- Step 2: The buyer chooses a local dealership at which to receive delivery.
- Step 3: The buyer configures the car.
- Step 4: The buyer chooses a payment option—cash or financing through GM or the customer's own bank.
- Step 5: The buyer presses “Go,” which authorizes the system to locate a car that meets the customer's specifications and determines a delivery date.

Source: www.celta.com.br



number of vendors that are part of the process. Customization will mean that these transactions will be more dynamic—they will happen in smaller volumes but with more frequency. Dell, for example, uses information systems extensively to manage both its customer demand and its supplier relationships. By linking consumer orders and specifications with information on its suppliers, the computer giant has reduced inventory dramatically. Dell believes that its investment in information systems has allowed it to replace “inventory with information” (see Figure 2–4).

Electronic marketplaces for manufacturing inputs will enable companies to manage this flow of inputs even better, providing more efficient pricing mechanisms and improving

information flows among suppliers and purchasers. The early failures of electronic exchanges in the past two years have demonstrated the complexity of these transactions. However, future improvements will make these systems increasingly able to manage these transactions by addressing their complexity. For example, software will be designed to address issues such as the historical reliability of a vendor, the capacity of a vendor to fulfill its obligations over the life of the contract, and the nuances of negotiation and bargaining—all characteristics that are crucial even in apparently simple transactions.

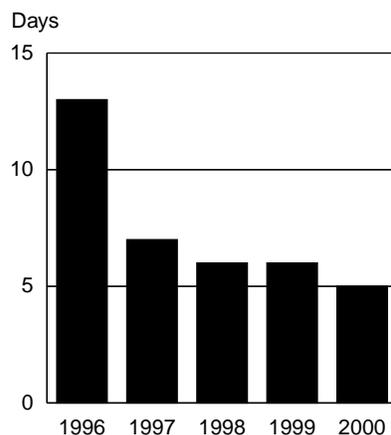
The transformation of the manufacturing segment of the supply chain in the past two decades has reshaped the structure of the supply chain itself—it can no longer be truly described as a linear *chain* but as more of a web-like *network* with the consumers at the center. As this network becomes more sensitive to the consumer and becomes flexible enough to respond to real-time consumer demands, it will support a greater flow of smaller batches of products, traveling quickly through the supply network over long distances.

#### *Distributed Final Assembly*

For industries in which customization goes the furthest, another transformation will occur—production will grow increasingly distributed. Once basic modules are manufactured at the main plant, they will be shipped to local markets, where final assembly and customization will take place. These final assembly centers will be located very close to customers so they can have direct input into the product design.

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*Figure 2–4*  
*Dell: Using Information Systems to Reduce Inventory*  
(Days of supply in inventory)



Source: Dell

In the shorter term, customized products may be assembled similarly to the way house paint is produced today, with base manufacturing done centrally and customization—mixing the colors, in this case—done at assembly plants within metro areas or possibly even small, neighborhood locations. To accomplish this form of distribution, core modules for each product will be produced in large manufacturing facilities. These centers will have the most sophisticated technology and will be capital intensive. Such manufacturing plants will need new layouts, with bays for alternative sizes and designs, for example. They will need to be integrated with logistics systems capable of handling a continuing variety of small loads of parts coming in and different products going out. This will call for a radical redesign of manufacturing space.

In the longer term, innovative new manufacturing processes will enable more distributed manufacturing of products. One example of distributed manufacturing is the “Chinese box,” so-called because one could theoretically drop it anywhere in the world, even in remote parts of China. This device is an intelligent manufacturing box. It has been successfully used to produce custom boat molds on-site. This box could, in theory, be dropped in a Home Depot parking lot. A Home Depot customer could pick out her preferred Jacuzzi design (size, shape, color, and so forth) in the morning, for example, and come back in the afternoon to pick up her freshly manufactured, customized hot tub.

Similarly, scientists at the Massachusetts Institute of Technology have developed a rapid-

prototyping machine that creates complex customized parts in a few minutes. Working like a three-dimensional laser printer, the device lays down layers of a granular powder that hardens to produce custom objects designed on a computer. This technology is currently being used in micro-scale applications to create small electronic components and medical implants. As the cost of these three-dimensional printers falls, this type of prototyping technology could be used to create larger customized consumer products in neighborhood locations within the next decade. One can imagine a local car repair shop using such a device to manufacture instantly a replacement distributor cap based on a design it downloads from a “design supplier.” The increase in customized products will enhance the appeal of locally manufactured parts.

#### **Design: Growing in Importance**

The far-reaching changes already occurring in manufacturing and distribution in response to changing consumer demand are setting the stage for perhaps the most important changes in the supply chain—in the innovation, product design, and development phases. These changes will affect both the technical and aesthetic design of products.

First, consumer demand for more customized products will create the need to incorporate consumer input into the design process. Second, the transformations of the manufacturing part of the supply chain and the efforts to achieve scale in a customized environment will place pressure on product designers to develop and design products well suited to

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**In the longer term, innovative new manufacturing processes will enable more distributed manufacturing of products.**

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**D**esign will become one of the most dynamic elements in the new demand networks.

mass-customization techniques. As information and collaboration allow these two drivers to work together, design will become one of the most dynamic elements in the new demand networks.

#### *Consumer-Centric Design*

As information about individual customer needs and preferences is collected and filtered back into the supply chain, R&D processes will incorporate this feedback and become more consumer-centric. Product life cycles will grow shorter as marketers compete to respond to consumers' increasingly sophisticated tastes, and as product developers incorporate the latest breakthroughs in basic technologies into their products. Aesthetic attributes such as look, color, feel, shape, and texture will become even more important elements in product design. Apple and Sony have been tremendously successful in applying stylish and colorful designs to the previously putty-gray world of personal computers with their iMac and VAIO product lines.

As this trend toward customization intersects with trends toward globalization, R&D and product development will undergo another transformation. The range of choices consumers demand will expand as customized products are introduced to customers in new and diverse markets. Product design functions will become increasingly localized. This trend is already evident in certain industries, such as the consumer products industry. Leading consumer products companies are beginning to provide increasingly localized product offerings so that globally distributed products adapt to differences in local markets. Siemens, a manufacturer of consumer electronics, for example, has located one-third of its research

staff at 56 locations outside its home market. These R&D outposts adapt input devices, displays, language, and programming options to local standards and culture. As products go global, and at the same time get closer to the consumer, demand for R&D facilities in distributed global locations will rise.

Information flows will also affect the way products are designed. Feedback about new product introductions and consumer behavior will influence product design as this information becomes more accurate and travels back to designers more quickly. As seen with Zara's product shelf life of less than a month, this consumer information will have the effect of further shortening product life cycles.

The consumer impact on design will flow even farther back along the supply chain, affecting even basic research. Pharmaceutical companies have led the way in incorporating consumer demand in basic research by integrating knowledge from their marketing departments into their R&D efforts. These companies allocate research funds within their organization based on indicators of future consumer demand, such as consumers' disease incidence, demographics, and lifestyles. The coming revolution in genomics, whereby the connections between food and health will be better understood at the molecular level, will enable consumer-targeted R&D to occur on an even more precise level.

#### *Designs for the Demand Network*

The shift to more customized products will have indirect effects as well. As the manufacturing core of the supply chain adapts to accommodate changes in consumer demand, design will play an important role in creating products that can be efficiently customized in the manufacturing process.

In this way, the interface and interaction between manufacturing and product design will become a key area for operations improvement. Tighter collaboration between the two parts of the supply chain will become essential for some of the mass-customization schemes, such as modularity and self-customization, to work efficiently. For self-customization, designers will need to find ways to create standard products with controls that customers can personalize. For platforming, designers of several products need to work together to agree on a standard foundation on which to build. Similarly, for modular production, designers are challenged with breaking down designs into component parts that can be integrated with other designs and products, which must adapt quickly to innovation and new technologies.

#### *Customization and Standardization*

Product design will become a complex arena as designers attempt to serve consumers demanding customization and manufacturers demanding standardization. Although designers have dealt with this tension in the past, the complexity will become heightened as a larger share of products is customized. In short, the tensions between scale and differentiation—between standardization and customization—will find their roots in product design. As customization becomes important for a wider range of products and gains a bigger market share in important product categories, design will become an especially dynamic and disruptive piece of the supply chain.

Manufacturers can only hope this tension will be resolved at the design level as well. Collaboration may play a key role in helping firms deal with this tension. Collaborative computer-aided design systems, communica-

tions technologies, and innovative organizational and compensation structures that reward collaboration will all be instrumental in enabling this type of collaborative design.

#### **CONCLUSION: THE SHIFT FROM SUPPLY CHAIN TO DEMAND NETWORK**

**T**he top-to-bottom transformation of the traditional supply chain initiated by greater consumer involvement and better customization capabilities will affect how companies are defined and organized. The combination of increased outsourcing and a consumer-driven supply network will transform the concept of corporate boundaries. Organizations in the network will be identified not only for their brands, people, and operations, but also for their external links, relationships, and partnerships with other entities. Moreover, the vast technological infrastructure supporting the evolving network will allow the seamless flow of information, enabling a further shift from a manufacturing industry that supplies mass quantities of goods to one that responds flexibly to individual consumer demands.

As companies prepare to move from supply chain to demand network, they would do well to:

- *Understand the changes.* Companies that develop a deep understanding of the complex transformations taking place will be able to better identify the opportunities that will emerge in the demand network. Companies should develop a strategy for their participation in the demand network and make the necessary investments in technology and relationships now.
- *Develop a network of outsourced relationships.* Outsourcing strategies will grow as firms

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**P**roduct design will become a complex arena as designers attempt to serve consumers demanding customization and manufacturers demanding standardization.

concentrate on those functions they do best—for example, product design or marketing. Much of the shift toward outsourcing in the late 20th century was driven by a realization that other entities could do certain things better, faster, and less expensively. As this idea has made its way throughout the supply chain, links in the chain have given way to much more integrated and flexible relationships as companies engage in an array of strategic alliances to improve their marketing and innovation. Firms will be transformed from vertically oriented hierarchies to nodes on a diverse, horizontal network of specialists.

- *Identify opportunities to customize.* Although product customization may not make sense for

many businesses, opportunities to do so must be assessed now. Critical decisions regarding which approach to take in this changing marketplace should be considered. Shifting to mass-customization models requires significant planning and investment, and companies planning to do so should start that process now. Others should consider alternative ways to respond to more demanding customers by identifying opportunities to provide more personalized services to enhance the value of commodity products.

The next chapter discusses the challenges and realities that organizations face as they rethink their supply chains and move toward more flexible demand networks.

## BARRIERS TO CHANGES IN THE SUPPLY CHAIN

*Although many transformations are taking place along the supply chain, companies looking to take advantage of a more flexible network of suppliers that is more responsive to consumer demands will have to overcome several major barriers. As a result, despite the technological innovations transforming different segments of the supply chain, real transformation will be slow. Challenges associated with legacy infrastructures and processes, corporate cultures, and market uncertainties plague even the best of today's supply chain managers.*

Aligning and balancing the variables in these complex systems will be no small feat, but companies that recognize the roadblocks, and plan routes around them, will emerge as leaders of the transformation. Indeed, they will be able to shape the future of commerce rather than simply inherit it.

Through in-depth interviews with supply chain experts, we identified four key barriers companies must confront in restructuring their old-world supply chains into new-world demand networks:

- Old economy manufacturing processes.
- Inefficient and outmoded logistics systems.
- Problems with cultural change: learning to share.
- The difficulty of anticipating true customer demand.

### **BARRIER 1: OLD-WORLD MANUFACTURING PROCESSES**

**A**s supply chains have gone global, their complexity has increased with the involvement of more suppliers and the need to move more goods, faster, across greater distances. Although many process and technology innovations have been introduced that help manage the complexity, consumer demands for more customized goods—which imply smaller shipments and just-in-time delivery—are virtually impossible to meet in the context of old manufacturing paradigms.

Indeed, the need to adapt quickly to changing consumer demands will become paramount for success. Although systems introduced at the distribution end of the supply chain have created new streams of

**I**ncreasingly, product design based on the mass-customization model will enable flexibility that can't even be imagined in the context of mass-production models.

customer information, which have led to increased efficiencies throughout the chain, manufacturers in particular are constrained by their inability to adapt production processes quickly and to manage costs effectively. In a recent study of global manufacturing companies conducted by Forrester Research, 74% of respondents observed that they did not have the flexibility to transfer production from one plant to another in response to changing market demands. Most are constrained by inconsistent production systems and equipment, which lead to increased labor costs, lost sales, and frustrated customers (see Table 3–1).

Increasingly, product design based on the mass-customization model will enable flexibility that can't even be imagined in the context of mass-production models. Even today's mass-customization processes focus on removing downtime in the supply chain, so that existing production facilities can be better utilized. In the future, it will be the other way around—

collaborative product designs will determine the layout of the production line from the beginning. This will enable more flexible production runs in smaller facilities with highly efficient processes, such as modular assembly and just-in-time delivery of materials.

For most industries, however, many deeply entrenched barriers will impede dramatic transformations of the manufacturing process in the near future. The flexible manufacturing processes that have defined the success of such high-tech industry players as Dell and Cisco are unlikely to transfer easily to other areas of manufacturing that have long-established traditions, complex legacy systems, large investments in existing equipment, specialized labor forces, partnerships with suppliers that help plan and organize efficient delivery, ties to distribution systems that operate in set patterns, and heavily unionized workers. Moreover, companies that lack the clout and capital of powerful industry players are unlikely to be able to start from scratch as GM did with the Blue Macaw facility in Brazil, as discussed in Chapter 2.

In particular, for the majority of manufacturers, issues concerning old-world production, labor constraints, control over customer information, and systems integration will present key challenges that must be overcome in order to reinvent one of the most important pieces of the evolving demand network—manufacturing.

### Mass Production

Much of the efficiencies gained in old-world production models were made popular by Frederick Taylor in the early part of the 20th century. Taylor, author of *The Principles of Scientific Management*, outlined a form of

*Table 3–1  
Manufacturers Have Limited Flexibility  
(Percent of 50 global manufacturing  
companies responding)*

*“What do you do when you are capacity constrained?”*

Work overtime	38
Outsource	32
Reallocate production	30
Lose sales	28
Build more factories	14
Doesn't happen	4
Don't know	4

Source: Forrester Research, 2000.

industrial engineering that established the organization of work, which came to define mass-production models like that of Ford's assembly line. In this work, Taylor stated,

... The greatest prosperity can exist only as the result of the greatest possible productivity of the men and machines of the establishment ... when each man and each machine are turning out the largest possible output ...

Upon closer examination of Taylor's work, it becomes evident that many of his ideas were widely misinterpreted, with employers using his principles to extract more work from workers for less pay, creating an imbalance of power between employers and workers. Nonetheless, for much of the 20th century, manufacturers gained increased process efficiencies by applying Taylor's principles to manufacturing engineering. This focus on efficiency led to the next big manufacturing evolution, driven by the influence of Japanese manufacturers such as Toyota, in the 1980s. The focus on lean manufacturing led manufacturers to eliminate much of the waste and complexity from the manufacturing process, and to make significant investments in large automated plants in pursuit of extreme efficiency. In the heyday of lean manufacturing, it was not uncommon for large auto manufacturers, such as GM, to spend up to \$1 billion on new vehicle plants.

However, for many companies, now that manufacturing has been stripped to bare essential processes, there is little flexibility to move production as consumer demand shifts, to adapt production processes based on cus-

tomers' feedback, much less to accommodate the needs of mass-customization production.

### Labor Issues

The tension between employers and labor interests that Taylorist production processes intensified also limits a company's flexibility in adapting to the rapid pace of change that defines the modern marketplace. In many of the biggest manufacturing industries, efforts to reduce labor costs by means of new production methods or more flexible labor from supply partners are limited by commitments to organized labor. Indeed, unions such as the United Auto Workers (UAW) have strict rules regarding the direct participation of suppliers on the factory floor. Thus, when it comes to decisions to implement efficient new technologies or to revamp supply chain processes, labor concerns are a critical issue.

For instance, GM's efforts to implement learnings from its experiment with modular production in the Blue Macaw facility, which uses 50 to 60% fewer workers than a typical U.S. assembly plant, led the company to a major confrontation with the UAW. GM's proposal to overhaul two existing production facilities and build two new plants in the United States, modeled on Blue Macaw, was a core issue in the disagreement that caused UAW workers to walk out in the summer of 1998, shutting down operations. This cost the company billions of dollars.

Similarly, the International Association of Machinists and Aerospace Workers (IAM), Boeing Corporation's largest union, is in the process of suing the airplane manufacturer. IAM maintains that Boeing violated contract obligations when it shifted work among its manufacturing facilities and supply partners

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**F**or many companies, now that manufacturing has been stripped to bare essential processes, there is little flexibility to ...accommodate the needs of mass-customization production.

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**Smaller players that lack both resources and influence may be at a disadvantage in an information-driven market.**

to reduce underutilized factory and warehouse space as part of an overall effort to reduce supply chain costs.

Even though many large manufacturers are looking to gain cost savings by moving manufacturing to suppliers, this tactic will become less effective in the future. For instance, unlike labor in the basic automobile industry, labor in the parts industry—the suppliers of the large OEMs—is estimated to be only 10% union. However, more integration between, and the colocation of, suppliers and OEMs could create more common interests among their workers boosting union efforts to organize the parts industry. Needless to say, successful efforts to implement changes in manufacturing processes and at other key points along the supply chain will require companies to work closely in partnership with labor interests. If companies cannot make the shift to more flexible production to accommodate growing demands for customization, players on both sides of the negotiating table will suffer.

#### **Control of Customer Information**

Increasingly, as discussed in Chapter 1, companies that “own” the customers and their data will be the locus of power and influence in the evolving demand network. For the most part, this type of data is still hard to come by at the back end of the supply chain, since it is controlled by larger players with access to more sophisticated information technologies. Indeed, larger players have more resources to invest in sophisticated information-sharing technologies and more influence to encourage information sharing throughout the chain. Smaller players that lack both resources and influence may be at a disadvantage in an information-driven market.

For example, large companies have been the first to implement proprietary technologies such as EDI to facilitate electronic transactions and simulated test marketing (STM) applications to simulate market situations at a fraction of the cost of other market research methods, and at much higher accuracy. Although the Internet has opened opportunities for small businesses, such companies still face many disadvantages in the new world. Those that can afford the technologies to provide secure access to better information will be able to manage their supply chains more effectively. Smaller players will be more vulnerable in the networked world, since they will have fewer resources to contribute to building and maintaining the network. To be successful, the smaller players along the chain will have to align with the larger players likely to emerge as critical nodes in the demand network.

#### **Systems Integration**

In the next five years, poor information technology infrastructure in the supply chain will continue to be a major challenge for manufacturers in particular. Right now, there are a multitude of different systems up and down the chain that must learn to talk to each other in order to facilitate a seamless exchange of information. Although new technologies are making cost-effective systems integration more possible, more must be done to establish universal standards, such as creating a common language for describing information that can be used across systems.

Many organizations, such as the National Institute of Standards in Technology, are conducting R&D in the area of manufacturing systems integration. Their work acknowledges

that most global manufacturers continue to struggle to manage their own internal production processes, much less the coordination of production across suppliers. In fact, Forrester Research found that nearly 40% of manufacturers that operate across borders cite “poor visibility into plant operations,” which translates into an inability to utilize plants to full capacity, as the single biggest problem with global manufacturing. Issues related to information flows, such as inaccurate demand forecasts and poor communication, follow close behind (see Table 3–2).

Most global manufacturers are unable to operate effectively in a real-time networked environment. In reality, the production operations of even the most highly automated plants and factories cannot easily be adapted or reconfigured to accommodate design changes and new product lines. Moreover, inconsistencies and incompatibility across manufacturing software applications often require costly customized solutions for systems integration.

Poor communication also plagues the manufacturing process. From a technology perspective, for example, XML formats will allow diverse systems to communicate online and exchange information. However, from a practical operations point of view, descriptions of even the simplest of materials vary significantly across companies. This lack of standardization makes it difficult for companies to integrate systems effectively and share such information. Any time a person has to resort to a phone call to verify information, the whole process slows down. Thus, in order to be an effective link in the new demand network, many manufacturers must rethink their traditional processes, even to the point of agreeing on what to call specific parts and activities and collaborating more closely with partners and suppliers.

## BARRIER 2: INEFFICIENT AND OUTMODED LOGISTICS SYSTEMS

In our interviews with supply chain experts, most respondents agreed that the biggest opportunities in a transformed supply chain are for the logistics providers. By logistics, we mean more than just the movement of physical goods: the management of information and processes that ensure the efficient function of the entire supply chain. As companies move toward just-in-time inventories, due to mass customization in manufacturing and direct customer sales interaction, shipping volume and costs both within the supply chain and to the end customer will increase. If consumers, retailers, and brand manufacturers emerge as important nodes in the evolving demand network, logistics providers will emerge as the critical links connecting the nodes to a wide network of partners and suppliers.

As networks of relationships emerge as the dominant supply paradigm, logistics solutions will be critical components of the design and function of emerging models (see sidebar, “Logistics Solutions: The Critical Link,” on page 36).

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**I**f consumers, retailers, and brand manufacturers emerge as important nodes in the evolving demand network, logistics providers will emerge as the critical links connecting the nodes to a wide network of partners and suppliers.

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*Table 3–2  
Biggest Problems with Global Manufacturing  
(Percent of 50 global manufacturing  
companies responding; multiple responses  
accepted)*

Poor visibility into plant operations	38
Inaccurate demand forecasting	36
Poor communication	24
Supply shortfalls	18
Poor customer satisfaction	8
Don't know	8

Source: Forrester Research, 2000.

### Logistics Solutions: The Critical Link

The best examples of supply chain breakthroughs today are in logistics. For example, Dell and Flextronics are pioneers in building the digital network into their manufacturing processes and logistics relationships. Their approach requires suppliers and partners to be located close by or on-site, thereby reducing the time needed for transportation throughout the entire production process.

In this regard, thinking through the logistics systems that best support new manufacturing processes is critical to transforming the supply chain into a demand network. Experts maintain that whole-systems approaches are required for real breakthroughs. Some identified three-dimensional concurrent engineering (3-DCE)—which ties together product design, process design, and supply chain design—as imperative in moving toward mass customization.

Some of the players entering the logistics arena are not surprising—they include the usual suspects, such as the delivery companies (UPS and FedEx), postal services, and freight and shipping companies (more commonly referred to now as “global logistics providers”).

Consolidation in the logistics sector is a key strategy for achieving economies of scale and improving delivery

density. In the European postal sector, in particular, there have been a number of major consolidations since 1998 (see Table 3–3). Indeed, many of these players have already gone beyond the mere movement of goods to provide a range of services in the supply chain, including warehousing, packing, and inventory management. UPS’s logistics unit, just seven years old, is now a \$1 billion-plus business, having grown 58% in 2000. UPS anticipates another 40% increase in 2001.

Other players are stepping in to fulfill the vital logistics function as well. Contract manufacturers are providing much more than manufacturing capacity. They now offer a whole range of services, including information flow management and logistics services, such as tracking materials as they move through the supply chain to ensure efficient manufacturing operations. Indeed, the players that will succeed in the evolving demand network are likely to own a piece of the logistics or delivery processes. Not all successful players will own a fleet of trucks, but they are likely to obtain the necessary expertise through partnerships or acquisitions. This will give them better control over planning and scheduling throughout the entire network.

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*Table 3–3*  
*Recent Consolidations in the European Postal Sector*

#### **Deutsche Post**

- DHL (Germany)
- Danzas (Switzerland)
- Global Mail and Quickmail (U.S.)

#### **Swiss Post**

- Mail Distribution System (Germany)

#### **TNT**

- CTI Logistx (U.S.)
- Taylor Barnard (U.K.)
- Bartlatier S.A. (France)
- GFW (Austria)

#### **The Post Office**

- German Parcel (Germany)
- City Mail (Sweden)
- Citipost (U.S.)
- Crie (France)

#### **La Poste**

- DPD (Germany)
- Geodis (France)
- Brokers Worldwide (U.S.)

Source: Company annual reports; various news articles.

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### Outmoded and Over Capacity

Although innovative logistics solutions will be key drivers of supply chain transformation in the next decade, existing inefficient logistics systems potentially are some of the most significant barriers to that transformation. For the most part, the infrastructure supporting the lifeblood of the New Economy still operates in the mid-20th century mode of shops, trains, planes, and delivery trucks. There will be some evolutionary advances in the basic infrastructure in the next few years, such as the Airbus 380 and improvements to long-haul trucking logistics. The Airbus, for example, will feature almost 50% more floor space and 35% more seats than the largest passenger planes today, and will offer more payload capacity and range on freight shipments. It will be one of the first freight aircraft that can cross the Pacific nonstop, and may reduce long distance air-freight charges. In addition, new logistics technologies, which manage the flow of information between shippers and transport companies more effectively, such as those provided by Logistics.com, will enable better fleet capacity management. In the future, we should see fewer empty truck runs and more trucks, trains, and planes loaded closer to capacity.

But as transportation needs increase both within the supply chain and along the final mile to consumers' homes, we can also expect existing delivery modes to reach saturation. The trucking industry already must deal with critical issues such as roadway congestion, safety, rising gasoline prices, and driver shortages. The fact that most of the transportation infrastructure around the world is government owned and operated, or still under government regulation, also contributes to the slow pace of change that characterizes the industry.

### Managing the Complexity

Although information technology is creating opportunities for third-party logistics players to hold a major role in effective supply chain management, there are sometimes too many variables to control. Most supply chain experts agree that logistics is the link where the breakdowns most often occur. For instance, each time goods move from one part of the infrastructure to another, say, from a ship to port, and port to truck or rail, any number of things can impede progress. Once goods come into port, there may not be enough trucks to haul them away in a timely manner, for example. Or en route to a manufacturer, a truck could break down or have an accident—all factors contributing to costly delays and inefficiencies for other players in the supply chain.

### The Elusive Final Mile

Currently, experts estimate that efficiencies achieved in delivery, distribution, and warehousing account for 10% of revenues. However, when dealing with the smaller shipping volumes required of the more flexible demand network, some of the efficiencies achieved in the current mass-production processes can be lost. As shipping becomes more expensive, many experts expect increased costs to flow directly to consumers.

Thus, providing cost-effective delivery along the final mile to the consumer will continue to be a major challenge in responding to shifting consumer demands (for more information on the final-mile challenge, see the Consumer Direct report *Forecasting the Consumer Direct Channel: Business Models for Success*, 2000).

A critical piece of the solution lies in generating route density. In the past year, we have

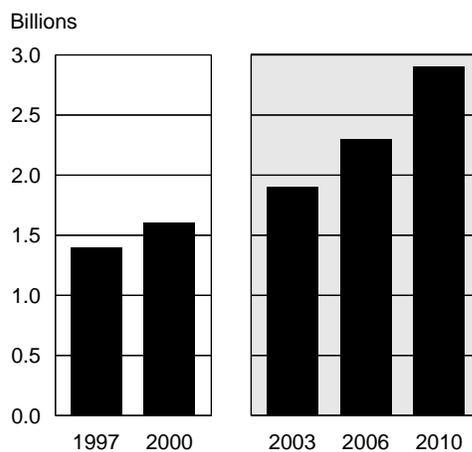
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**As transportation needs increase both within the supply chain and along the final mile to consumers' homes, we can also expect existing delivery modes to reach saturation.**

seen many of the New Economy upstarts in the home grocery delivery arena, such as Streamline, Shoplink, and Kozmo, succumb to the cost challenges of providing fast, efficient delivery. Although we expect demand for home delivery to continue to grow (see Figure 3–1), costs associated with meeting consumer needs, such as attended and unattended delivery models, flexible delivery times, and high-touch, service-oriented delivery people, will continue to dampen consumer demand for such services and, thus, plague final-mile delivery efforts to scale up.

This is a particularly important problem to solve, since the success of the demand network depends on the quick fulfillment of consumer transactions, by definition.

*Figure 3–1  
Parcel Deliveries to the Home Will Continue to Grow  
(Billions of parcels in North America)*



Source: Institute for the Future and Peppers and Rogers Group

### **BARRIER 3: PROBLEMS WITH CULTURAL CHANGE! LEARNING TO SHARE**

Perhaps the greatest challenge in reconfiguring the supply chain is cultural change—moving from competition mode to collaboration mode. In making this shift, companies must address issues of information sharing, human behavior, and internal support to ensure that they are prepared to participate in a demand network.

#### **A Seamless Flow of Information**

Increasingly, companies are entering into partnerships, not only with their suppliers but also with potential competitors, which makes many companies reluctant to share their most valuable customer data. Yet a true demand network depends on just such a seamless flow of information, from the consumer all the way to the materials suppliers.

If knowledge is power, then, understandably, many companies with access to high-value customer information are not willing to share. In the old world of business, hoarding information gave companies a competitive advantage. In the new world, however, hoarding information only causes inefficiencies. For example, consumer product manufacturers are often frustrated because retailers retain control over important information, such as sales and promotions data, that could directly affect activities and planning on the factory floor. Although a few companies with an enlightened perspective share information freely, such as Wal-Mart, most hold back when it comes to high-value customer information, including data on sales, transactions, and preferences.

Furthermore, concerns about the security and privacy of proprietary company informa-

tion and consumer data also inhibit information sharing (see sidebar, “Data Security: Protecting the Backroom,” on page 40). Not only are the companies concerned about breaches to the security of their own information, but consumers are growing increasingly concerned about how companies are using their private data and are stepping in to take greater control. (For more information on privacy, see the Consumer Direct report *Personalization: Managing Opportunity and Risk in the Consumer Direct Channel*, April 2001.)

To succeed in establishing a demand network, companies must convince consumers of the value of partnerships and obtain the consent of consumers to utilize information among partnership networks. Increasingly, companies will have contracts with their partners to govern the control of customer data, heightening sensitivity and increasing liabilities associated with the mishandling of information among partner companies. They also must break through their own cultural reluctance to share information, even among their own organizations.

#### **Limited Sharing of High-Value Customer Information**

The problem with information sharing will not be a shortage of information. The Gartner Group estimates that by 2004, the average company will have collected 120 terabytes (120,000 gigabytes) of customer data. Rather, the challenge lies in knowing what to do with the information—how to analyze it and actually use it to drive demand network efficiencies. In the absence of clear, customer-focused, information-driven strategies, many companies will remain reluctant to open the doors to their data stores and to provide access to what is now viewed as the key to competitive advan-

tage in the marketplace. At the same time, holding the information so close to the vest lessens its value.

The difficulty in shifting competition-based corporate cultures to ones that embrace collaboration with a network of partners and suppliers means that many companies will remain reluctant to share high-quality customer data. Interviews with experts revealed that most expect that information sharing will be limited to general location demographics and market trends. Even then, information sharing will only take place among partners that have developed a “financially aligned” relationship. One respondent, a supply chain management consultant, remarked: “Companies are afraid that competitors might get access to this information and take advantage of it... The notion that everyone is going to share all their information with their partners and suppliers is somewhat naive.”

If the demand network of the future depends on the seamless communication of information around the network, companies have a long way to go (see Chapter 5 for possible strategies).

#### **Slow Changes in Human Behavior**

Regardless of the efficiency and functionality of new information technologies, human behavior and cultural context are very slow to change. Different entities along the supply chain have different practices and processes, making collaboration difficult. Indeed, most supply chain experts we interviewed identified human behavior as the major barrier in achieving efficiencies. Fear of change also inhibits progress and prevents many companies from taking advantage of the full functionality of the latest systems. One application

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**In the absence of clear, customer-focused, information-driven strategies, many companies will remain reluctant to open the doors to their data stores and to provide access to what is now viewed as the key to competitive advantage in the marketplace.**

### Data Security: Protecting the Backroom

On the one hand, the expanding land-scape of strategic partnerships, outsourced contractors, and third-party specialists exists because of the ability to exchange information easily on networked systems. On the other hand, this ability to share information creates new threats by giving more opportunities for hackers and industrial spies to get at this information as well. Moreover, the sheer complexity of the network makes it increasingly difficult to monitor system failures and track intruders. The Computer Security Institute, which conducts an annual survey of corporate security practitioners, reports that 40% of respondents detected system penetration from the outside, up from 25% in 2000 (see Table 3–4).

Indeed, some types of intrusions may go undetected altogether. For example, worms—programs that

spread through networks—do not require an outsider to break into a system directly; rather, the worms expose the network to outsiders from within, so that a company may not even know that sensitive information has been stolen.

Industry heavyweights such as IBM and Oracle are developing solutions to create a secure environment for corporate partners to open up backroom operations. Still, this type of information sharing will require active management to ensure that even legitimate business partners don't get access to valuable parts of the corporate database that should stay proprietary, such as vital intellectual property, customer contacts, and financial and strategic information. Maintaining data security as it changes hands along the supply chain will continue to be a major issue.

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*Table 3–4*  
*Network Security Issues*  
*(Based on responses from 538 computer security practitioners in U.S. corporations, government agencies, medical institutions, and universities)*

	2001	2000
System penetration from outside	40	25
Denial of service attacks*	38	27
Computer viruses	94	85

\*Denial of service attacks are characterized by an explicit attempt to prevent legitimate users of a service from using that service, and includes such activities as disrupting connections between two machines or flooding a network, preventing legitimate network traffic.

Source: Computer Security Institute, 2001 CSI/FBI Computer Crime and Security Survey.

developer who designs collaborative systems for supply chain partners commented: “Some of the challenges are that it is a new process and people need to overcome their existing perceptions, comfort level with existing systems, and fear of change.”

Without overcoming these ingrained human tendencies, the cooperation needed to establish the demand network will never come about.

### **New Competencies for Companies, New Skills for Workers**

From front-end, customer-facing jobs to back-end, blue-collar workers, new jobs and new skills will be required in order to enable an effective response to consumer demands. As new streams of information are created, companies in old economy businesses are finding that traditional skills are becoming less important to keep in-house. Outsourcing various functions to partners with specialized skills in areas like product development, manufacturing, and marketing provides more flexibility, increases efficiency, and lowers costs.

For many companies, this trend also means rethinking the skills and competencies necessary to support new corporate functions and structures. For example, Enron, originally a gas pipeline operator, now provides a broad range of other energy products. It capitalizes on its knowledge of the energy market and its ability to anticipate shifts in customer demand by hosting an online exchange where it buys and sells energy goods. As it made this shift to participate in the online market, Enron needed new types of employees. The company moved to replace its engineers with recruits from financial services, including traders, economists, and risk managers.

Experts anticipate that sales will become a much more crucial function throughout organi-

zations, as every point of interaction with a customer—whether it is a partner company in the supply chain or the end consumer—becomes an opportunity to deepen the relationship. In a recent article, Michael Schrage, a director at the MIT Media Lab, described the focus on maximizing the profitability of customer relationships in this way: “It’s the death of the salesman. Everyone in the organization, professionals and paraprofessionals alike, will be expected to sell, cross-sell, and up-sell. Research, development, manufacturing, and finance staffers will be taught, trained, and incentivized to sell, whether they like it or not.”

In this way, selling effectively becomes a measure of a company’s ability to provide value—to business customers, to the consumer market, to an individual—which will be vital in developing a successful demand network.

### **BARRIER 4: THE DIFFICULTY OF ANTICIPATING TRUE CUSTOMER DEMAND**

**D**espite all the technology and information available to help companies understand their customers, a piece of the equation that continues to elude even the most sophisticated players is the ability to forecast customer demand accurately. Even Cisco Systems, long a leader of the New Economy, boasting of flexible supply networks, free-flow information sharing, and innovative strategic alliance relationships, has not worked out all the complexities of the new demand networks. Despite a cutting-edge infrastructure and adaptable corporate culture, the uncertainties of the marketplace and volatility of fluctuating customer demand blindsided the company in 2000, resulting in a \$2.5 billion write-off for excess inventory at the end of the year. This black mark on the record of a

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**Selling  
effectively  
becomes a  
measure of a  
company’s  
ability to  
provide value**

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**M**ultiple factors are coming into play that will make anticipating customer demand harder rather than easier, despite the increasing availability of technology and information throughout the supply chain.

company that has developed and modeled the best practices of the transforming marketplace highlights the challenges ahead.

In fact, multiple factors are coming into play that will make anticipating customer demand harder rather than easier, despite the increasing availability of technology and information throughout the supply chain. Critical roadblocks include the realities of a real-time networked environment and the uncertainties of anticipating demand in an industry dominated by mass customization.

#### The Realities of Real Time

Methods for anticipating customer demand accurately are critical in making the shift to a demand network, by definition. By applying such methods, companies can better organize and prepare for the realities of a real-time networked environment, where information about the customer flows directly to the factory floor. As companies move closer to estimating “true” demand by interacting directly with customers, they will be better able to respond to the information that customers provide.

However, in a real-time environment, swings in demand are likely to be much more severe, making it more difficult to plan production. For example, during the 2000 holiday season, Dell struggled to meet customer demand for its top two high-end consumer PC systems. Dell, often cited as the paragon of just-in-time inventory management, operates a demand-driven production model in which products are not assembled, and in many cases parts are not even ordered, until a customer places an order. However, when demand for a 32 MB graphics card far exceeded estimates, the company had to delay shipments up to six weeks during a critical crunch time in the

holiday shopping season. Many customers didn’t receive the systems they ordered as presents in time for the holidays.

Similarly, Cisco’s inventory woes can be traced back to overly optimistic demand forecasts that prompted the company to build up inventories as part of a strategy to speed up shipments to customers. As the economy slowed, demand in some key product categories virtually disappeared, leaving the company holding on to some costly inventory overruns.

In the end, players without direct links to the consumer will face more challenges in responding to this new dynamic environment. But technologies that transmit real-time information to the factory floor, enabling shorter production runs, flexible uses of capital equipment, and distributed manufacturing closer to the end consumer will help, as will the availability of more sensitive market indicators created with the new information streams from consumers.

#### Demand in a Market of One

As companies think about moving toward mass customization—the market of one—critical questions concerning consumer demand for customized products will emerge, as well they should, since tremendous investments will be required for shifting production and distribution processes to support such mass customization.

Right now, although there are many industries that appear ripe for customization, many others are still unsure whether consumers will be willing or even capable of designing their own products. The fact that mass customization requires consumers to be heavily involved in the design or specifications of the product,

whether that means filling out personal profiles, selecting from a menu of options, or going to a store to have body measurements scanned in a high-tech booth, makes anticipating consumer demand for customized products even more difficult than usual. Consumers, especially sophisticated consumers, put a huge premium on their *time*. As the market shifts away from standardized goods, it is as yet unclear which products consumers will be willing to invest the time and effort to customize. The sooner companies figure this out, the better.

#### CONCLUSION: CRITICAL DECISIONS MUST BE MADE NOW

**M**any companies find themselves at a crossroads. Some will choose to define the shape of the evolving demand networks, others will be subject to what emerges, but few will be unaffected by the fundamental changes happening in the marketplace. As consumers gain more influence and power with the value of their information, companies must rethink their organizational and process paradigms. As companies plan for this new environment, key insights to keep in mind include:

- *Address areas of high inflexibility.* Certain pieces of the supply chain will be harder to adapt than others. In particular, improvements in manufacturing and logistics processes over the past century focused primarily on cost and

time efficiency, leaving little room for further incremental improvements. Thus, to introduce real flexibility into these functions requires a fundamental rethinking of these processes.

- *Move toward collaboration.* In order to be successful, companies in the demand network must learn to be great collaborators. Those that invest in developing the culture to support collaboration and the technology to enable information sharing throughout their demand network will have an advantage.

- *Replace uncertainty with good information.* As the information infrastructure gets built out, companies will have more opportunities to reduce uncertainty in the process, by relying on real-time information. However, companies must anticipate and prepare now for the demands of a real-time environment.

No single company will be able to do it all. Building and maintaining relationships with other participants in the network—through strategic alliances and partnerships—will grow in importance. Many long-held beliefs about business success will be challenged, and new models that optimize the advantages and efficiencies of new technologies will emerge.

The next chapter discusses the relationships and organizational models that will help companies overcome some of these critical barriers and provide the foundation for the evolving demand network.

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**S**ome will choose to define the shape of the evolving demand networks, others will be subject to what emerges, but few will be unaffected by the fundamental changes happening in the marketplace.



## RELATIONSHIPS ARE THE FOUNDATION OF THE DEMAND NETWORK

*In the last few months, the e-commerce research firm Gartner Group revised its B2B forecast downward by 20%. Forecasts such as Gartner's have been scaled back in part because of the recent economic slowdown, but also because the online B2B exchanges—also called electronic marketplaces—that were put forth as the key to a B2B revolution just haven't taken off. Indeed, according to one McKinsey & Company analyst, of the 1,200 online exchanges that were started in the last couple of years, only 800 remain, and what's more, only 200 of those are likely to survive beyond this initial shakeout.*

So, what happened? Online exchanges are based on the notion that procurement can be made significantly easier, more efficient, and less expensive. A buyer would simply place an order online, let the various suppliers submit their prices, and wait for the lowest bid to come in. What folks forgot in the B2B craze, however, is that, while price *is* an important factor in purchasing materials for production, qualities other than price matter too—in fact, they don't just matter, they often matter more. The consultancy Accenture recently surveyed 1,000 corporate buyers and found that 80% of them thought that a strong brand and reliable customer service both were more important than low prices when it came to making purchases online.

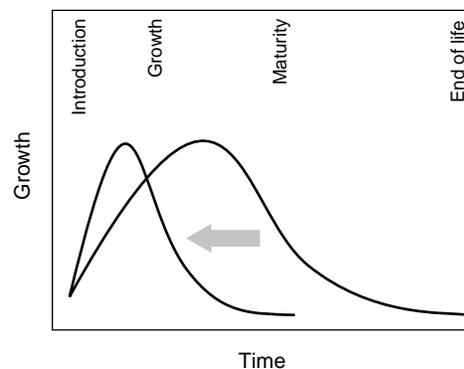
The near-fatal flaw in online B2B exchanges was that planners and prognosticators ignored the importance of relationships up and down the supply chain. Purchasers don't just look for the best price. They seek out suppliers that can offer the total package—top-quality products, reliable delivery, a high level of customer service, and the ability to customize orders to meet specific needs. They look for the total cost of ownership for the goods and services they're buying, not just the purchase price of the product. Indeed, the most successful B2B relationships are those in which two companies develop a deep understanding of each other's processes and procedures. In this way, they can expand the relationship even to the point of including collaboration

in R&D or product design. This partnership allows the two parties to focus on their strengths and to increase overall efficiencies. Under these circumstances, value is derived from suppliers that can provide the total package.

In the past two decades, buyers and sellers have worked hard to develop such relationships with each other. Over time, many of these relationships have blossomed into full-blown strategic partnerships, where the buyers and sellers collaborate on a wide range of activities, such as information systems, capital investments, and product design. It has become clear that relationships matter in the traditional supply chain and are likely to be one of the defining factors of the evolving demand network.

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Figure 4-1  
The Shrinking Production Cycle



Source: Sturim, Robert. *Achieving Competitive Advantage through Supply Chain Integration*. Vitria Technology, Inc., 1999.

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### THE RELATIONSHIP IMPERATIVE: THE NEED FOR FLEXIBILITY

**F**lexibility—the ability to respond quickly to changing needs in a dynamic competitive environment—is critical for firms that want to succeed in the demand network. Production cycles are getting shorter as consumers demand greater variety in products and services all the time (see Figure 4-1). In order to meet this demand, firms all along the supply chain are looking for flexibility from suppliers. They need to be able to adapt production processes quickly and refine the features of a product based on consumer feedback (sometimes in the middle of a run). Often they require customized service to accommodate complex and unique needs.

For example, in the high-tech manufacturing sector, products like routers and switches are being designed on the fly, with product specifications being continuously updated and modified to improve performance. An executive at AMR Research estimates that a typical high-tech box, such as a PC, goes through an average of 650 changes per week!

New technologies are making this type of flexibility possible, but even more important are the relationships between the manufacturers and the buyers. These two entities must be fully committed to sharing information and working cooperatively to make such radical improvements in the production process.

### External Relationships Proliferate: Outsourcing

A major transformation in the supply chain took place around 1970, when large multinational corporations began moving activities previously performed in-house to outside companies. The rigid vertical structure of early

mass-production manufacturers, like Ford, that once owned their entire supply chain from parts to assembly to distribution, began to break down. Instead of making parts themselves, such companies began to rely on outside suppliers that could produce certain components faster, cheaper, or better. Many of these suppliers were located in low-cost regions in other countries, particularly Southeast Asia and, to some extent, Latin America.

Outsourcing activity accelerated in the 1980s and 1990s as the supplier firms themselves achieved scale and became increasingly competitive with the large firms that would soon become their customers (see Table 4–1). Large networks of supplier firms emerged, each of which supplied multiple firms. Reductions in transportation costs and information costs enabled these networks of suppliers to become efficient on a global scale. As a result, the supply chain became global and involved many different players to produce a single product. Corporations outsourced an increasing percentage of steps along the supply chain as firms experienced the benefits of efficiency and flexibility that outsourcing provided.

**Taking It to the Limit:  
Total Outsourcing**

In the 1990s, outsourcing not only grew in intensity, but it also began to spread in scope—creating the infrastructure upon which the demand network is now evolving. Firms began outsourcing large parts of the manufacturing process to outside vendors. Some firms went as far as outsourcing *all* their manufacturing operations.

The consumer electronics industry is particularly well suited for total outsourcing. Contract manufacturers in this industry, such

as Solectron, Flextronics, and Celestica, were incredibly successful in producing products for brand-name companies and grew quickly in the late 1990s (see Figure 4–2 on page 48). Handspring, for instance, maker of the Visor personal digital assistant, doesn't own a single factory, nor do any of its 400 employees deal with physical products. Orders for its products go to one of its fulfillment partners, such as Modus Media Incorporated, which handle inventory. From there, the orders then go to Flextronics and Solectron, which make, package, and ship the Visors. In 2000, 11% of worldwide consumer electronics were manufactured on a completely outsourced basis.

Brand-name consumer products companies that espouse this model, such as Ericsson, Phillips, and Sony, are becoming vastly different entities. The core of their business is now centered on innovation and marketing rather

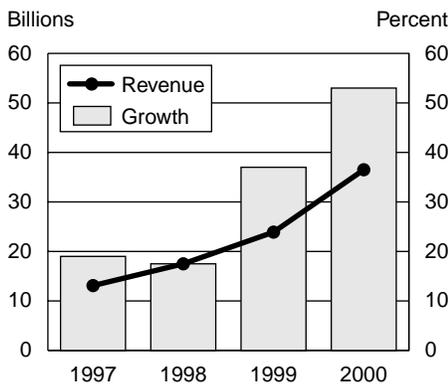
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*Table 4–1  
Outsourcing on the Rise in Key Industries  
(Percent of inputs to production sourced from outside the firm)*

	1987	1997	Percent Change
Computers	57	87	+31
Consumer electronics	50	63	+13
Drugs	38	51	+13
Apparel	58	70	+12
Household appliances	57	69	+12
Health and beauty	47	58	+11
Transportation	67	73	+6
Food	69	71	+1

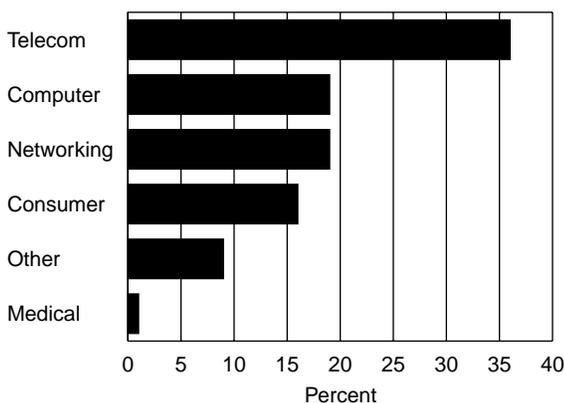
Source: Bureau of Economic Analysis

Figure 4-2  
Rapid Growth in Consumer Electronics Contracts  
(Annual revenue in billions of dollars and percent growth of top four electronics contract manufacturers)



Source: Institute for the Future and Peppers and Rogers Group; data from Solectron, Celestica, SCL Systems, and Flextronics.

Figure 4-3  
Outsourcing Is Not Just for Mobile Phones  
(Percentage of revenues by industry)



Source: Institute for the Future and Peppers and Rogers Group; Flextronics.

than production and assembly. As the consumer electronics industry seems particularly well suited to pushing the outsourcing model to its extreme, it is also acting as a model that other industries will soon follow. A look at the diversity of the Flextronics customer base suggests that industries other than consumer electronics are actively outsourcing their manufacturing as well (see Figure 4-3).

The Arthur D. Little consulting firm estimates that the pharmaceutical industry outsources \$30 billion worth of business, with large manufacturing firms like DSM Catalytica providing everything from the chemical inputs to the end packaged good. Similarly, consumer products, food, and apparel manufacturers all rely heavily on outsourced resources.

### THREE TIERS OF RELATIONSHIPS

Not all relationships are likely to be as extreme as in the total outsourcing model. In fact, a spectrum of relationships is emerging based on the strength and nature of the points of connection in the network. Our interviews with supply chain experts identified three tiers of relationships between buyers and suppliers, each with different degrees of true partnership:

- *Commodity relationships*, which involve sellers that provide the lowest-cost goods to meet a buyers' needs; these relationships can be fairly anonymous, and there is little to no real partnership or information sharing.
- *Basic relationships*, in which some information is shared between the parties to ensure cost-effective outcomes, but full partnerships are neither expected nor desired.

- *Strategic partnerships*, which imply a long-term relationship with the suppliers that are most important to the buyer's operation, in which buyers and sellers work cooperatively and share information extensively to achieve shared goals.

### **Tier 1: Commodity Relationships**

While we are focusing on the importance of relationships in the supply chain, it is important to note that not all transactions conducted must involve complex interactions. Some inputs are simple exchanges of commodities, such as raw materials and common maintenance items, or basic services like cargo transport, in which the most important factor is price. Who the supplier is matters far less than the cost of the product and perhaps the delivery schedule.

B2B exchanges and auctions can play a role here. When price and a reasonable delivery time are what matter most, a B2B exchange can facilitate fairly anonymous and efficient transactions that save the buyer time and money. Of course, these exchanges may also help some companies find suppliers with whom they want to build deeper relationships after the initial transaction. Online exchanges can bring formerly unknown suppliers into the buyer's world, increasing the pool of potential partners.

### **Tier 2: Basic Relationships**

In the past 20 years, buyers and suppliers formed partnerships to leverage supply chain efficiencies. Using technologies like EDI and ERP systems, companies began to share information, such as inventory, production, and forecasts, with key suppliers. Today, a large company might have such relationships with several dozen, or even hundreds or thousands, of suppliers. Technologies and partnerships

like these bring significant improvements in efficiency to the supply chain.

Wal-Mart, for example, has been a leader in redefining the retail supply chain for the better part of the last decade. Through direct contact with consumers and innovative technology strategies, Wal-Mart has been able to amass the largest database of customer information in the world. Driven by the goal of serving its customers better and supporting its everyday low-price concept, sharing information with suppliers is at the core of Wal-Mart's supply chain strategy.

In fact, Wal-Mart's proprietary network, Retail Link, is several steps ahead of other supply chain management efforts in integrating the company's EDI networks with an extranet used by its buyers and more than 10,000 suppliers. Indeed, the system links about 90% of Wal-Mart's global suppliers in sourcing and other collaborative business processes. This information technology-driven strategy enables Wal-Mart to gather and disseminate information about sales and inventory levels, at the lowest level of detail, online and in real time.

### **Tier 3: Strategic Partnerships**

In general today, "flexible" supply chains, much less true demand networks, are hardly the norm. With increasing consumer demand for products that meet their needs as closely as possible, manufacturers are turning to true strategic partnerships to help build flexibility into their supply chains.

Strategic partnerships are the top tier of relationships. Companies that have adopted the idea that collaboration—sometimes even with competitors—can make the supply chain more

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**O**nline exchanges can bring formerly unknown suppliers into the buyer's world, increasing the pool of potential partners.

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**Even the largest companies are rethinking their supply chains and shifting their focus to collaboration to remain competitive.**

efficient and drive costs down are developing strategic partnerships with other companies. For example, in May 2001, Coca-Cola and Procter & Gamble (P&G) created a very interesting strategic partnership. Coca-Cola realized it wasn't doing a very good job selling its noncarbonated drinks, and P&G realized it wasn't doing a very good job selling drinks and snacks in general, so the two put their "troublesome" products into a joint venture between the two global giants. The partnership between two powerhouse companies like Coca-Cola and P&G, which dominate many consumer advertising and distribution channels, is notable in itself. Yet the partnership also demonstrates how even the largest companies are rethinking their supply chains and shifting their focus to collaboration to remain competitive.

Similarly, Dell Computer has created deep relationships with its 25 most important component suppliers and has used these relationships to establish itself as a nimble, low-cost leader in the personal computer industry. Dell has set up a private Internet site for these suppliers, which gives them real-time updates of Dell's inventories as well as incoming customer orders. Dell also sends a purchasing forecast to its top suppliers each week, indicating how many hard drives, processors, and monitors it plans to purchase in the coming weeks. This information allows suppliers to ramp up production in anticipation of coming demand. These suppliers in turn provide Dell with regular updates of their anticipated costs and prices for the components. Dell can then forecast its costs for producing computers in the future, enabling it to set prices accordingly and to maintain its margins. In the future, Dell aims to deepen these relationships with suppliers even further by moving beyond collabora-

tive forecasting to collaborative design, using the Internet to enable Dell engineers to design components in conjunction with engineers working for its most trusted suppliers.

The success of these high-level relationships depends on trust and a seamless flow of information. As information systems among suppliers become more integrated, building and reinforcing trust between partners is crucial. For instance, we have already described how Wal-Mart has developed basic partnerships with its suppliers, but recently it has taken Retail Link a step further. In the last year, Wal-Mart has created a special private link into its system for only its most strategic partners and most critical transactions, thereby providing a secure forum for the exchange of high-value information among this elite group.

In this way, relationships between business entities differ only marginally from business-consumer relationships. Building one-to-one relationships through the exchange of information remains the most important opportunity for strengthening and deepening both business and customer relationships.

#### **ONE-TO-ONE RELATIONSHIPS IN THE DEMAND NETWORK**

**O**ne vital component of the emerging consumer-centric marketplace is the ability for companies, through the use of new technologies, to establish one-to-one learning relationships with consumers. These one-to-one customer relationships are the result of a company's ability to track each contact with a customer, learn from that customer's feedback, and tailor product, service, or communication based on that feedback. A company's ability to respond to individual customer needs depends on its ability to mobi-

lize its network of suppliers and partners in response to this information about what the customer wants.

And so it goes for every player participating in the evolving demand network, each of whom has a customer to serve: retailers serve consumers, manufacturers serve retailers, contract manufacturers serve product manufacturers, component suppliers serve manufacturers, raw materials suppliers serve component suppliers, and the warehousing and transportation players serve virtually everyone. As the function and quality of these relationships continue to grow in importance, managing them effectively and deepening them to maximize their value will be an important element of success.

While the basic strategies of identifying, differentiating, interacting, and customizing apply, there are special strategies for managing customer relations in a B2B environment. In *One-to-One B2B*, PRG outlines the seven critical areas where B2B strategies differ from B2C strategies. Three of them are especially salient in this discussion of the growing network of relationships among corporate firms: developing relationships within relationships, selling by developing accounts rather than simply adding customers, and focusing on just a few large customers.

### Relationships Within Relationships

The most obvious difference between selling to an individual and selling to a business is that the consumer is a single decision-making unit, while the business has many decision makers. Because many people will have purchasing discretion in a business, the B2B organization must not only develop and grow its relationship with the business customer as an overall organization, it must also develop relationships with

divisions, departments, groups, and individuals within the organization. Thus, supplier companies are implementing tools to empower individuals within the organization to interact directly with them. For example, Web-based applications for procurement, such as those used by Office Depot and FedEx, enable business customers to empower purchasing decisions to be made directly by the individual or group that needs the product or service.

### Account Development Selling

Because of the complex nature of business customers, a B2B company that focuses on developing a relationship with its best customers is likely to be more successful. There are advantages in developing deeper account relationships with fewer customers as opposed to focusing on increasing the number of new customers acquired. When they are in the buyer's seat, companies are looking for suppliers that can help them achieve their goals. Suppliers that are focused on account development rather than market penetration will employ customer-centric and loyalty-dependent strategies and will be able to help their customers achieve their goals—and be successful themselves at the same time.

For example, airline companies have devoted significant resources to providing a higher level of service to business travelers—from the creation of in-flight business-class services offering more comfortable seating and better amenities to reward programs that provide significant loyalty incentives to the frequent business traveler. This focus on deepening these relationships with high-value business customers has in turn prompted the air-services demand network to respond in kind. For example, in an effort to provide business travelers options

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**A** company's ability to respond to individual customer needs depends on its ability to mobilize its network of suppliers and partners.

for remaining connected traveling, Boeing is equipping its 747s with high-speed data networks, while Tenzing Global, a satellite-based global-roaming Internet service provider, will allow in-flight passengers to access their e-mail accounts and surf the Web at speeds up to 11 Mbps. These options enable commercial long-distance air carriers, such as Singapore Airlines, Cathay Pacific, and Virgin, to provide an even higher level of service to their most valuable customers.

#### Just a Few Large Customers

While a B2C company is likely to have thousands or millions of customers and can rely on generalized statistics about groups of customers to make decisions and then act to serve them, a B2B company usually has a much smaller customer pool and should not act on generalized conclusions about its customers. By developing at least basic partnerships with most customers and strategic partnerships with their best customers, suppliers can tailor their actions for each customer.

The impact of even one relationship on the business of a B2B supplier can be tremendous. For instance, when Bridgestone ended its 95-year relationship with Ford, it also relinquished an estimated 43% share of Ford's market for passenger car and light truck tires in North America. This loss is Ford's next biggest supplier's gain, as Goodyear, which held an estimated 23% of Ford's business, can now step in to fill the void left by Bridgestone's exit.

#### CONCLUSION: A COMPANY WILL BE MEASURED BY THE STRENGTH OF ITS RELATIONSHIPS

In the evolving demand network, the need to serve the customer in concert with multiple partners and suppliers necessitates a foundation of strong relationships. In this new world, a company's value will be tied closely to the extent and quality of its external relationships. To be successful, companies should keep the following insights in mind:

- *Create flexibility through a network of relationships.* Over the past 30 years, companies have outsourced an increasing percentage of corporate functions to outside suppliers of goods and services. In turn, they have realized the benefits of increased flexibility and cost-efficiency. In the future, a company's ability to be agile in a constantly changing marketplace will depend on the quality and diversity of its relationship network.
- *Maintain a spectrum of relationships.* In order to meet varied and complex needs, companies must increasingly rely on external relationships to respond to dynamic customer demands effectively. However, there is not one type of relationship that will enable companies to meet all these needs. Companies must develop competencies in maintaining a spectrum of relationships, from those that require the least investment to those that require significant commitments from partner companies.

- *Develop metrics to measure relationship value.* In the demand network, new metrics for measuring business success will emerge to evaluate a company not only on its revenues and profitability but also on its flexibility, external networks, and execution speed. In order to gauge performance, a company must be able to measure its effectiveness in building

its external network, as well as the value of key B2B relationships.

The next chapter will explore the strategic opportunities that exist for companies to overcome the barriers discussed in Chapter 3 and to emerge as key players in the transformed demand network.



## HOW TO CREATE THE DEMAND NETWORK: IMPLICATIONS AND STRATEGIES

*In a world in which sophisticated consumers are demanding more relevant information, as well as customized products and services, partnerships within the demand network are imperative for success. Indeed, no single company can tackle the challenges and coordinate all the processes required for meeting the needs of today's consumers—processes ranging from product conceptualization to retail sales. To support flexible responses to these ever dynamic customer demands, companies must develop a network of strategic partners with expertise throughout the demand network.*

The evolving information infrastructure will create opportunities for new nodes to emerge in the network and new links to form between them. Only companies that learn to leverage these relationships will be able to overcome the barriers to moving from the old supply chain to the new demand network presented in Chapter 3, and thus put themselves in a position to succeed in the 21st century. But first, they will have to break down the barriers by employing the following strategies themselves or by partnering with companies that are able to:

- Transform old economy manufacturing.
- Move logistics into the 21st century.
- Solve the problem of cultural change: learning to share.
- Learn to anticipate true customer demand.

### TRANSFORM OLD ECONOMY MANUFACTURING

**A**s companies that traditionally provide low-margin commodity products move into the new demand network, they will find an opportunity to stimulate growth and increase profits by integrating the capacity to customize their products with their basic manufacturing processes. Their key challenge will be developing cost-effective ways for integrating ultra-efficient processes for commodity production with the customization process as a seamless whole.

Although customization won't make sense for everyone, innovative companies are experimenting now to identify future opportunities to respond directly to individual customer needs—whether it be

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**As the market moves toward individualization and customization, transporting materials and products quickly and efficiently will become more challenging and more costly.**

through personalized services or mass-customized products. However, those companies that want to take advantage of the benefits associated with mass customization face unique challenges. Making this shift will not be easy and will require key strategies for planning and investment.

#### **Collaborate to Lower Capital Investment Costs**

As major product manufacturers take on more strategic partnerships with key suppliers, some of the risk associated with large capital investments in production plants and equipment can be shared across organizations or even passed on altogether. GM's collaboration with its key suppliers in building and operating the Gravatai Automotive Complex in Brazil is a prime example of the significant savings that cost-sharing can generate (see sidebar on page 25, in Chapter 2). Similarly, brand companies such as Hewlett-Packard and Handspring are reducing or even eliminating the capital investment required for production facilities, by engaging in strategic partnerships with contract manufacturers that have more flexibility and resources devoted to implementing mass customization.

#### **Move Closer to the Consumer**

In the longer term, distributed manufacturing technologies will make postponing customization more possible. This will enable goods to be assembled and customized much closer to the end consumer, while retaining the benefits of scale early in the process.

#### **Leverage Strategic Relationships for Design Innovation and Production Efficiency**

Collaborative product design is performed jointly by partners (product manufacturers, materials manufacturers, suppliers, and even retailers) to customize the brand company's product to meet the demands of individual customers. The customization is not the key element here—the collaboration is. For example, contract manufacturers, such as Flextronics and Solectron, provide not only manufacturing capabilities but also a full spectrum of services, ranging from product design to supply chain management. In this way, they work closely with partner companies in the development and design of products to improve their manufacturability and speed up time to market.

#### **MOVE LOGISTICS INTO THE 21ST CENTURY**

**A**s the market moves toward individualization and customization, transporting materials and products quickly and efficiently will become more challenging and more costly. Not only are companies faced with an aging transportation infrastructure, but the complexity and unpredictability of global logistics will remain one of the key barriers to success in the demand network. However, innovative companies are developing solutions to meet this challenge, and in the process may very well gain control of what will be one of the most important functions of the New Economy.

### Streamline Logistics

Some manufacturers are tackling the issue of logistics by moving manufacturing sites closer to their best consumer markets. This saves them time in distributing products but sets up challenges for their suppliers. In some cases, manufacturing firms have pushed the imperative to solve logistics problems even farther back along the supply chain by persuading suppliers to colocate near their decentralized manufacturing plants. For instance, Dell requires suppliers to locate within a certain distance of its assembly plants, which reduces the cost of logistics and enables on-demand manufacturing. Likewise, automobile manufacturers, such as GM, are emulating the industrial park model of nimble contract manufacturers like Flextronics by colocating suppliers on a campus that houses production assembly, raw materials processing, and components manufacturing. In this way, Flextronics has radically reduced the need to ship unfinished goods over long distances. Moving goods from supplier to manufacturer becomes a matter of automated tow tractors traveling around a campus rather than planes, trains, and trucks traveling around the world. In this way, suppliers and manufacturers can work in concert to ensure the just-in-time delivery of the necessary components onto the assembly line.

### Don't Forget Scale

One assumption of the evolving demand network is that good information can substitute for economies of scale. In the logistics arena, this remains to be seen. As more goods must be

moved in smaller quantities to individual customers, adequate route density (the final-mile challenge) becomes a major factor in managing delivery costs effectively. The demise of many of the high-profile CD grocery delivery providers came in part from their inability to build their capital-intensive distribution models up to scale—to reach the final mile.

Of the grocery delivery services that remain, those that have created an efficient model for local, neighborhood distribution continue to show promise. PDQuick, formerly known as Pink Dot, is now in its thirteenth year. This delivery company relies on a distributed network of small, neighborhood warehouses that enables its drivers to deliver convenience store-type goods in less than 30 minutes.

Likewise, Peachtree Network, a Montreal-based application service provider for North American grocers, supports online shopping in more than 200 grocery stores. It has successfully bypassed the final-mile challenge by leveraging local stores as pickup sites. Peachtree partners with local grocers, providing them with online tools to help with order management and in-store fulfillment, ensuring customer orders are filled efficiently and accurately. Peachtree also operates the online site for grocery partners, providing store customers with access to a comprehensive online food shopping portal that lets them shop online, download recipes, and access nutrition information.

### Use New Transportation Technologies

Although transportation vehicles, such as airplanes and trucks, will continue to evolve

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**O**ne assumption of the evolving demand network is that good information can substitute for economies of scale. In the logistics arena, this remains to be seen.

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**C**ultural change will not just “happen,” at least not quickly enough to make a difference in a rapidly changing market.

slowly with only incremental gains expected in areas like increased capacity and efficiency, information systems will enable much more effective management of the existing infrastructure. For instance, technology and service providers such as Logistics.com are providing end-to-end technology solutions, enabling much more effective capacity management for truck, air, and rail transportation.

#### **SOLVE THE PROBLEM OF CULTURAL CHANGE: LEARNING TO SHARE**

**O**ne of the most significant barriers to the new demand network lies in the fundamental human tendency to resist change. At the individual and organizational levels, the fundamental changes in responsibilities, processes, technologies, and organizational structures required to operate effectively in the demand network will only be achieved by radically transforming company cultures.

#### **Designate a Cultural Change Leader**

Sometimes, to change strategies, companies must first change cultures. And like any other business challenge, this one must be addressed head on, with full knowledge of goals and consequences. Cultural change will not just “happen,” at least not quickly enough to make a difference in a rapidly changing market. To do it right, organizations must systematically guide cultural change. For example, when Novartis CP, the Latin American agrochemical division of the global firm, faced enormous changes to its core businesses brought on by the biotechnology revolution, the company identified a senior executive as the unofficial “culture change” agent for the firm’s sales force. This role is responsible for strategically planning and guiding the firm’s internal re-

sponse to external changes by doing such things as identifying gaps in the organization’s structure, creating the necessary training programs, and aligning compensation structures with company objectives.

#### **Establish Trust to Ensure Security**

As relationships become the dominant organizational paradigm characterizing the demand network, trust among network members is essential. Indeed, as information systems across organizations become more integrated, leveraging technology to balance the tension between sharing information and controlling access to information will be crucial for the development of these trusted partner relationships. Establishing this type of trust is largely a cultural issue. Some companies encourage trust, and others do not. Wal-Mart’s move to provide increased access to its internal databases for key strategic partners is an example of the growing role technology will play in building such trust between two organizations (and the opportunity for value-added transactions for all involved). But this type of information sharing only works because it has been structured into the organization; that is, it has been made part of the culture. Without this type of proactive cultural change, companies and their workers are likely to be left flailing in the wind at a time when they most need to be working together.

#### **LEARN TO ANTICIPATE TRUE CUSTOMER DEMAND**

**T**raditional supply chain processes are built to respond to forecasts of demand. However, forecasting will always be flawed, because no matter how accurate the data on which it is based, it is always just a best guess.

The key to success in the demand network is to replace forecasts with the real-time flow of information among network partners, and thus to make the forecast itself a smaller input into the decision-making process. To facilitate such a real-time information flow, companies must take some key steps.

### Build the Infrastructure

Key investments in information systems should be made in collaboration with key partners in the demand network. Identifying the right tools for information sharing and integrating systems across organizations is a critical first step toward realizing the benefits of real-time information exchange.

### Partner!

Increasingly, consumers will get value from combinations of products, or product offerings embedded in a range of services, rather than from a single product. To treat an allergy, for example, a company might bundle a dry-cleaning process combined with a skin-care lotion and a diet plan. To get the best value from these combinations, companies must form strategic partnerships to learn which combinations will appeal to consumers, to help consumers understand the value of those combinations, and to assemble a network that can share that information and help the company respond efficiently to the demand for flexible new combinations.

### Establish Links to the Consumer

Consumer information is central to the smooth functioning of the demand network, yet information will remain incomplete, especially as consumers turn to permission-based marketing to protect their privacy. (Permission-based

marketing means that companies must get an explicit agreement from consumers to send them product information or to share their information with partners.) To provide value, companies will need to establish direct links to the consumer as the main source of the permission-based contract, or indirect links as the trusted user of a portion of that information that can add value to consumers without infringing on their privacy.

### Market the Network

The real value in building a demand network is in the exponential increase in the value of any one company's information about the customer when combined with other information in the wider network. As data between two organizations is shared and processed for the correlations and links, a more complete picture of the consumer as an individual, as well as shifts in the consumer market as a whole, can be compiled. The consumer will appreciate the increased value that comes from networked information as long as the information is kept securely within the network and used appropriately as part of the partnership.

### CONCLUSION: INCREASED FLEXIBILITY, GROWING COMPLEXITY

Whereas the use of technology and access to information in the new demand network will increase a company's flexibility, the complexity of building flexible relationships and managing information flows effectively will grow. As consumers gain more influence in the marketplace, companies will need to implement simple solutions to manage the increasing complexity of the marketplace, in order to be successful.

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**A**s data between two organizations is shared and processed for the correlations and links, a more complete picture of the consumer as an individual, as well as shifts in the consumer market as a whole, can be compiled.

Success, however, will not come easily in this new environment. Organizational structures are different, processes are untested, and the metrics to evaluate success don't even exist yet. But the rewards promise to be great. As the mass market breaks down into markets

of individuals, and as incentives to acquire new customers give way to the value of loyal customers, the nature of competition in the marketplace will evolve to support collaboration and increase the opportunities for real innovation to take place.